GAS JOURNAL

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COKE DEVELOPMENT WORK

WHEN the Gas Industry pulls up its collective socks and decides to do something, it usually does it well. What is needed is someone to start things moving. Until that happens inertia may lead to temporary stagnation. The coke position was bad and looked like becoming worse after the war of 1914-18. Then it was that the London gas undertakings formed the London Coke Committee, with Mr. Nicol as the spear-head, and tackled the technical problems of using coke for industrial purposes in particular. This work became highly successful and an outlet was found for much coke that had been a drug on the market once coal became plentiful again after 1918. Nevertheless, this was only a beginning. It required someone with the vision to see what was needed and the enterprise to put it right. Fortunately, those whom Dr. Hartley, at the annual meeting of the London and Counties Coke Association, reported in our issue last week, referred to as "men of foresight" were at the head of affairs and through them there was formed the L.C.C.A. in the early 1930's. The hard work of Mr. Foot, Mr. Boon, Miss Wooster, and the staff in general enabled coke marketing to be put on a plane that has proved to be a model to the rest of the country. They accomplished their task very well. The L.C.C.A. is in that sense the mother of all coke associations. The work of all the coke associations is now co-ordinated and assisted by the National Federation of Gas Coke Associations, and coke marketing has become firmly established with the essential principle that producers and merchants should work together, price-cutting competition being ruled out.

The future policy of the Gas Industry in regard to coke must now come under consideration. The Chairman, Colonel Harold Smith, in his report referred to the coke marketing price policy and to the need for re-examination of the conditions governing the marketing of coke after the termination of the war of 1939-45. It was natural for the governing body to turn to the report made in November, 1943, by the National Federation of Gas Coke Associations, and a committee has made suggestions concerning methods of evaluating coke in comparison with other competitive fuels, proposals for the development and extension of the coke levy scheme to cover sales of coke made outside gas undertakings' own areas of supply, and also proposals for standardizing merchants' margins, standard extras for sized coke, uniform contract scales for merchants and consumers, and a standard extra price of 5s. a ton for sales of coke in quantities of under 5 cwt. This report has been approved in principle. It has now been decided to implement at once the recommendations dealing with merchants' margins, standard extras for sized coke and for delivery in small parcels of under 5 cwt., on the understanding that gas undertakings will not be asked to bear out of their revenue any increase in cost involved. The Chairman expressed the opinion that the coke price position had been "tidied up" considerably and that there was a very good foundation on which to build for the future.

A Complex Problem

That is all very well so far as it goes. We do not know the details of these arrangements. They are no doubt commercially satisfactory, but it appears to us that they will involve an increase in the cost of coke at consumers' premises. What that increase will be is not disclosed, but the gas undertakings have made it clear that they will not bear it. Equally, the merchants will not. The consumer who cannot afford to buy coke in lots of 5 cwt. or more will also have to pay another 5s. a ton. All this is no doubt sound accountancy. But is it sound economics? and above all is it in the best interests of the Gas Industry? It is not without reason that the Chairman's report indicates that the Committee is "very concerned" at the high level which has been reached by coke prices, culminating in yet another increase of 8s. 4d. a ton in the last fortnight of October. It is no doubt correct that the price of coke has moved upwards with the price of coal and that the relation between the two prices has remained balanced. The unfortunate fact is that as the price of coke increases, the advantage of using it in comparison with the more refined fuels decreases, so that ultimately everyone will prefer to use gas to the exclusion of solid fuel. Lest there should be those who hail this position with approval we hasten to remind them of the Fuel and Power Advisory Council's finding that neither gas nor electricity could possibly meet the winter peak loads for space heating and that only by the use of solid fuel would this be possible. Anyone who doubts this need only calculate the capital cost of the plant that must stand idle between half and four-fifths of the year to supply winter fuel requirements during cold spells which in mild winters may last a few days only.

The rising price of coke is one of the symptoms of the general rise in prices that is the surest sign of inflation. Soaring fuel prices are reflected in rising prices of goods made with a considerable expenditure of fuel, such as iron and steel. Rising prices of iron and steel mean rising costs elsewhere. The Gas Industry is largely powerless since rising coal prices are the basic cause of rises in the price of gas and of coke. They are not the only reasons, as we have seen from Colonel Smith's comments. It may be that too much of the increases in the cost of coal and transport is put on to coke and too little on to gas. That is a matter for calculation, but in allocating price increases between the various products derived from coal, it is well

to remember that, when properly adjusted, the cost of domestic heating is the minimum when using gas and coke in conjunction, as was pointed out in the Institution Paper by Messrs. Holliday, Dunning, and Andrew. Whatever the actual prices in relation to those of competitive fuels, every care should be taken to retain this position.

Incidence of Coal Output

The basic cause of the unsatisfactory price position is, of course, the price of coal. The year of office of the National Coal Board has been marked by rising prices, strikes, and failure to take decisions. Whatever is wrong goes back to this root cause. The blame, if blame there be, cannot be laid at the doors of private enterprise. There are many reasons why output in the coal mines is below what should be possible. The crux of our industrial difficulties is output. In almost every major industry, and coal is no exception, labour charges are the greatest single item. In the coal industry something like 70% of the cost is due to labour; the only way to bring the cost of coal to reasonable figures is to increase the output per man-shift at the same labour cost, but, instead, the five-day week and the acceptance of any wage demands the Miners' Union makes have raised costs without increasing output per man-shift. What is the reason for the labour unrest in the coalfields? Is it the lack of incentive; is it the long-range control exercised from headquarters; or is it that now that the miners have got whatever they have asked for they have lost their interest in life? Lord Hyndley recently emphasized that the purpose of nationalization was "not merely to unify the industry but to give it a new deal." We are waiting to see some beneficial results from this new deal. The subject is very close to that of coke because it is only by reduction in the price of coal, with improvement in quality, that any real decrease can be brought about in the price of coke.

Supplies of coke have been difficult for some time. The extended use of coke for water gas manufacture last winter did not help matters. Although that policy has been officially reversed, it is doubtful whether the gas supply can be kept going without using the water gas sets. The increased output of iron and steel that has been demanded and achieved will require considerable tonnages of coke from ovens. The London area has always imported considerable quantities of coke; it may be more difficult to secure supplies this winter than ever before. The need for "programming" (official euphemism for rationing) coke will be accepted by everyone. The outlook is not good. It appears to many that, in planning for scarcity, we are planning for a condition that will last for many years.

Coke Allocation and Quality

Under these conditions, the most that the Gas Industry can do is to see that coke is properly divided among those who desire to buy it and to do everything possible to maintain and improve its quality. There are many who may be reconciled to pay what little the tax gatherer has left them for good fuel, but who will object strongly to paying the same price for a blend of shale and water cemented by carbon and sulphur. One day there will be a national fuel policy. It was originally the primary purpose of the Ministry of Fuel and Power to introduce such a policy. In that policy coke must occupy an important place. The Simon Committee in its report on Domestic Fuel Policy said this: "We recommend that it should be the policy of the Government to replace bituminous coal in all single house appliances by smokeless solid fuel as rapidly as adequate supplies can be provided at a reasonable price."

A Departmental Committee was set up to consider the implementation of this report: what has happened to that committee we do not know, but there is little doubt that at some time, perhaps sooner than many believe, a smoke abatement policy will be put into effect. Coke producers must be ready against that time. The quality of the coke that we offer to the public will have a considerable bearing on the fate of those proposals. Coke will be in competition with anthracite and smokeless, low-volatile, Welsh coals. It is desirable that there should be competition so that each can keep the other technically alive, searching for improvements. That, by-the-way, is a reason why gas coke marketing should not be brought under the National Coal Board. It is well to remind ourselves of the findings of the Simon Committee: If smokeless fuels are to be popular, the report says, it is essential that the quality should be good and regular. This involves two things: (a) The highest possible proportion of the fuel supplies must be graded into sizes suitable for the various types of domestic appliances; (b) supplies of suitable coal or mixtures of coal must be ensured to the carbonizing industries, and the coal specially cleaned at the collieries to reduce the ash content to an economic minimum. The report adds this warning note: "Although some fuels are satisfactory from both points of view, in the case of other fuels great improvements in these matters are still necessary. This is mainly a matter for the industries concerned, but it is important that encouragement and help should be given by the Government."

Important Recommendations

The National Federation of Gas Coke Associations, in its report on Future Coke Development issued in 1943, also emphasized the need for maintaining good quality. Coke quality, the Committee stated, and the maintenance of uniformity are of major importance if the requirements of the consumer are the governing factors both as to the kind of appliance to be installed and the kind of fuel to be used. "While it is appreciated that coke has to be made from a variety of coals and is subject to varying methods of carbonization it would appear possible to produce better quality coke and to maintain uniformity in quality without foregoing the most economic yield in the process of gas and coke manufacture. Equally important is the question of sizing, because most of the modern appliances require a sized fuel." It was to ensure that technical considerations should be properly appreciated and applied that the Federation appointed the National Technical Committee which has done so much good work.

The report of the Institution Committee on coke quality will be fresh in the minds of every gas engineer. Screening, and the general use of five sizes of coke, were prominent features of the report. In addition the Committee of Enquiry recommended that the present policy for the improvement of gas coke for the market should be developed, that appliance manufacturers should be encouraged to improve still further the design of special coke-burning appliances (this, as Dr. Hartley explained at the L.C.C.A. luncheon, is materially assisted by the avoidance of price-cutting competition so that the designer can afford to do development work), and that research should be conducted into the problems of coke production and utilization, particularly by the Gas Research Board in co-operation with the oven coke producers for the production of free-burning coke for the domestic open grate.

An Issue Needing Clarification

We have reminded our readers of all this development work in order to emphasize that much has been done, and that it is for the gas undertakings themselves to put what has been learnt into practice. It would be well if the attitude of the Coal Board to this question of domestic coke production were fully and finally clarified. It will not be forgotten that the Severn Valley Gas Corporation had an excellent method of making free-burning domestic coke by blending non-coking coal with coking coal, but that the price structure imposed by the coal industry killed the

venture. Will the present National Coal Board reverse this policy? Whatever may be the answer to that, the truth of the matter is that the improvement in coke quality which is so necessary can only be brought about and maintained by the handling of the production of coke by the individual gas engineer and manager. It is in his hands to make or mar the coke marketing arrangements that the coke associations are making. Coke prices may not be within his power to influence; coke quality is very largely a matter of local management. The one thing necessary, if that management is good, is that the Coal Board shall provide the Industry with the right quality of coal, cleaned from extraneous ash to the lowest economic limit. We understand that before long a comprehensive coal-cleaning policy will be announced by the Board. When that is achieved by the construction of new washeries, the "paper" total of coal available for sale will fall sharply, but industry will use a lot less heat units than are used to-day, and the gas and coking industries will be well on the way to a signal improvement in coke quality.

FOUR YEARS' DEVELOPMENTS AT PRESTON

THE fine Lostock Hall Gas-Works of the Preston Gas Company, dealt with in the Paper given by Mr. A. K. Collinge to the Manchester District Association of Gas Engineers—see later pages—is a monument to Mr. Tagg's prescience and Mr. Collinge's technical and managerial ability. Originally built for a capacity of five million cubic feet of gas per day it sustained an increase during the war years from 1,106 to 1,696 million cubic feet of annual output, after which it was expanded without difficulty by the addition of two of the original ten settings of Drakes vertical retorts. This expansion was the more necessary because of the serious increase in the summer load, reducing the period available for resetting and repairs. The extent of this is indicated by the fact that whereas the maximum weekly demand increased by 15½%, that of the months of May and June increased by 39% over the 1939 figures.

The lay-out and method of operation include many interesting features. Condenser cooling water is circulated from a gasholder tank with the result that ice formation in the tank is prevented in the very cold weather, but without undue rise of temperature in the warm weather. The installation of an electrostatic detarrer in 1943 has been attended with the usual advantages, decided improvement in the efficiency of the washing and purifying plants, but with some minor difficulties. There was the formation of tar emulsion, easily countered by circulation through the hydraulic mains, and the leakages of purifier valves attributed to the absence of a tar film on the faces, rendering it necessary to design valves with seats and discs both renewable, fitted with rotating gear. Estimation of the correct size and capacity of purifier boxes is always somewhat empirical. The truth is shown in the limit. Four boxes, 60 ft. × 40 ft. × 6 ft. deep, with a catch box 40 ft. × 30 ft. × 6 ft. with a total capacity of 990 tons of new oxide designed to purify five millions a day proved sufficient to cover 5¾ millions, but in view of possible further increase it was decided to install additional plant. The details are interesting, too. Mr. Collinge came to the conclusion that the greater expense of overhead purifiers was not justified, particularly when full use is made of the modern pneumatic tools, portable belt elevators, and mechanical loading shovels which are now available for use with boxes at ground level. Indirect heating by steam coils was rejected in favour of lagging with a little live steam in the gas stream. And, a very interesting feature, an inferential meter has been placed at the inlet of the new plant to effect control of the division of the stream between the two sets.

In the retort house we have the water sprays in the coke chambers, about which very little has been said. Mr. Collinge's set-up may be compared with that at Coventry described by Mr. A. E. West last year. There are one or two differences. At Coventry the spray is continuous whereas at Preston an intermittent spray is preferred. Mr. West found that he got 3% (by weight of coal carbonized) of steam from the sprays out of a total of 15%. Mr. Collinge gets 4½%. There are advantages in the water spray. Dust can, of course, be extracted by mechanical means and some installations have been very successful. But spraying up to a sufficient moisture content ex retorts can nearly eliminate atmospheric dust, at any rate in the screening plant. The coke chambers are cooled and working conditions, an important point, improved. There are some disadvantages, too. Corrosion of bottom castings and fittings is increased and there is, one of those "intellectual" disadvantages, an increased difficulty in measuring the amount of steam actually passing to the retort, never an easy quantity to control, though always an important one. Operating results over a period of seven years are extraordinarily good. Without the full data one must attribute the very low Fuel Efficiency Index to an unusual quantity of coke and breeze sold per ton of coal carbonized. Those engineers with higher figures may perhaps reflect that the values used in the computation of this index are somewhat arbitrary, making no allowance for differences in the calorific content of either coal or coke.

Mr. Collinge looks to the future with confidence. He sees that since 1941 the annual consumption per prepayment consumer in his district has risen from 17,600 to 26,500 cu.ft., that the quantity of domestic coal delivered to Preston has fallen from 240,000 to 125,000 tons, and that the increase in domestic gas consumption has been 1¼ million therms per annum performing the same duty as 20,000 tons of coal with the addition of 10,000 tons of coke. There is plenty of scope for further expansion in the domestic gas load. "The coal shortage, coupled with its soaring price"—it has increased in Preston 80% since 1939, against a 25% increase in the price of gas—"may be said to be one of the most influential factors which has affected the progress of the Gas Industry." He finds a pronounced preference (not always evident elsewhere) for gas appliances in the new housing estates, and finally he finds himself equipped with a works laid out with courageous foresight 22 years ago capable of extension to four times its original capacity.

GAS NATIONALIZATION

"Stretched to the utmost as it is to cope with the demands made on it in the present critical times, the Gas Industry must deprecate as untimely and dangerous the introduction of a Gas Bill at the threshold of the greatest economic crisis in our country's history. Now should be the time to leave well alone, at least while the crisis lasts, and not to introduce all sorts of doubts, disharmonies, and controversies into a vital public utility which has a fine record of efficiency and has not failed the public once during the two fuel crises we have experienced in the past year." These were the words of Colonel W. M. Carr in an address last week in Manchester to the engineers and managers and executives of the constituent undertakings of the United Kingdom Gas Corporation. We regard his speech as being of importance and significance and publish a full report in our issue to-day. The success of U.K.—and it has been successful; during the past 10 years it has extended its sales 140%, and had there been no war the expansion would have been something like 400%—is attributed by Colonel Carr primarily to two basic aspects of policy. First, that it has been left to those responsible for the conduct of individual undertakings to exercise their initiative and fully to shoulder their responsibilities; secondly that public gas supply is essentially a local matter—a personal service, not an abstract entity. We are in full agreement with these two tenets and need not amplify them here. The point which we would emphasize is that the operation of U.K. has been the reverse of bureaucratic, that the organization has been built up on existing foundations by men of experience. Remote control from a centre cannot provide a satisfactory substitute for individual responsibility and personal contact with the consumer.

Gas Service Pocket Book, 1948

The 1948 edition of the Gas Service Pocket Book will be available early in December, and to be sure of obtaining copies (the edition is limited) it is advisable to place orders early. The new edition includes for the first time since 1939 a Diary section planned specially for service, sales, and fitting personnel of gas undertakings. All the domestic aspects of gas usage—cooking, heating, water heating, refrigeration, home laundry, and lighting—are covered, while up-to-date information is given on pipes and meters, maintenance of appliances, fitting requirements and so on; and there is a section on coke and its uses. The price is 3s. 6d. a copy, post free.

Commentary by "Abaris"

Slow Cooking

Economy seems to be the national motto just now, and it is more than likely that the word is overworked to such an extent as to mean nothing. Anyway, Government Departments will continue to flog it, so we must be prepared to read it, hear it, and mark it.

Gas undertakings are doing their best to make people frugal in the use of fuels, to an extensive degree that some years ago would have appeared suicidal ; we have to, and that's that. The cooking load is large and there are many ways of cooking which, generally speaking can be divided into two parts—viz., fast cooking and slow cooking. Most women cook quickly because they are accustomed to so doing and because time is important; very few people indulge in the slow method. Protagonists of the latter had a stimulus recently when Mrs. Gaitskell, wife of the Minister of Fuel and Power, said that she liked slow cooking on her gas cooker. Slow cooking is alleged to cause less shrinkage in meats that are roasted and, therefore, the ration should go further. In addition it is claimed that the meat is more tender at the end of the cooking period. I am not an expert in matters that are not my province so I cannot dispute these two suggestions, but, and it is a large but, is this method prodigal with fuel ? I have already said that it is slow in time, but an oven with a thermostat does enable one to roast or bake over a period that can easily be estimated in the normal course. To slow this up considerably would require much practice. Usually, cooks allow 20 minutes per pound of meat, plus 20 minutes overtime on a moderate oven setting, and they get succulent results if the meat is not too stringy. For a 2 lb. joint the time taken is an hour; with slow cooking the time would be, say, doubled on a lower gas rate. Is this likely to save, or use more, gas ?

I should very much admire anyone who could prove the advantages claimed for slow cooking; the stew, for example, is oft-times simmering for about three hours. Is it proposed that stews be left on the gas for longer ?

A.D. 1952 ?

None of us, luckily, is gifted with a mind that can divine what will happen to-morrow, the day after, or in the year that is as yet unborn. The farther ahead one looks, the less likely is a prognostication to materialize; but one may weigh up a series of possibilities and suggest a course for future action. A living business or industry plans ahead in the hope—and sometimes with justifiable optimism—that the demands for its products, or services, will increase. Electricity and gas, for example, are planning just as if the threats of atomic power were tricks of the imagination.

Will the time come when a fuel dictator decrees which fuel is most suited to cooking, heating, and water-heating ? I am all in favour of such a pundit, provided always that he has the advice of scientists and non-political economists, for it would save much wasted energy in all its forms. The electrical industry considers that it can give convenient and cheap cooking, hot water, and space heating; its adherents and many supporters in Parliament, imagine electricity generation to be an economic process. The 25% efficiency they talk about is a bagatelle when compared with the 75% that can be achieved by a gas-works; but not 25% of those sitting in the House are aware of this great difference. If no fuel dictator is appointed, then we are likely to get competition between the present suppliers, even if both are shrouded in the blackcloth of nationalization.

Our salesmen have nothing to sell and our home service young ladies work sporadically here and fiercely there, but we must not throw away the goodwill that both have built up in the past. The women's service is one of the best forms of goodwill builder possessed by the Industry, and I frankly think that we should ensure that each undertaking gets trained, or untrained, women now, and prepares them for the day when a modicum of plenty returns to the earth. We do not want to see a rush over to electricity because fashion decrees that there's some mumbo-jumbo in an all-electric home; and the electricity suppliers do get some smart salesmen and women to push their wares.

We have a period of some three or four years in which to construct an intelligent and balanced sales and advisory force while our competitors build new power stations and endeavour to increase their efficiencies. I hope that the Gas Industry will take advantage of this period and set in motion the machinery for building an educated and dynamic outside staff.

Coal for Export ?

Great Britain used to get foreign currency by exporting coal. This very desirable state of affairs is temporarily *non est*. Some say that we should keep all our coal here and convert it into goods for export; this is the idealist theory, and it would work if we could compete with others in the world's markets. What goods could we make ? What licences would be necessary ? What permits would we have to get ?

The Americans stepped into Europe under our very eyes to woo buyers, and we cannot compete with them for we have far too many theorists. Commerce is a war; international trade is a sanguinary war at that, and there is no room for the obstructionist-conscientious objector in the modern world.

If we could export coal to Europe, how would we be paid ? In gold, dollars, or with goods ? Possibly only with the latter and this in turn would damage our own industries. From the top of Mount Fujiyama to the tip of Cape Finisterre the dollar is omnipotent; it has no peer. This apart from the purchase sof American oil used on the works; we are at present exporting creosote to the U.S.A. whereby we should acquire some of their dollars. Our whole prosperity rests on coal—*i.e.*, on the shoulders of the miners—and the current signs are most unfavourable.

Personal

Dr. F. M. H. Taylor (Thermocontrol Installations, Ltd.) has been chosen as Conservative candidate for the Gravesend by-election.

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Mr. Dennis Johnson, who has been with the Peterborough Gas Company for the past six years, has been appointed Works Technical Assistant to the Reading Gas Company.

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At the Meeting of the Industrial Gas Development Committeee of the British Gas Council held on Oct. 23, Mr. H. R. Hems retired from the Chair, and Mr. W. Dieterichs (Gas Light and Coke Company) was elected Chairman, with Mr. J. E. White (Newcastle-upon-Tyne and Gateshead Gas Company) as Deputy Chairman.

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Mr. Robert Beynon, one of the oldest members of the Institution of Gas Engineers, received a visit, on his 91st birthday, at the Asheldon Nursing Home, Torquay, from Dr. Harold Hartley, President of the Institution. In congratulating Mr. Beynon, Dr. Hartley conveyed to him the best wishes and birthday greetings from the members. Mr. Beynon was elected a member of the Institution of Gas Engineers in 1892 and he has been associated with the Gas Industry for the greater part of his life. He will be remembered as the Engineer and Manager of the Torquay Gas Company from 1885 to 1923, when the Torquay and Paignton Companies were amalgamated and he took his seat as a Director on the joint board of the two Companies, and served in this capacity for a period of 20 years. Mr. Beynon is also an Honorary Member of the Southern Association of Gas Engineers and Managers of which Association he was President in the year 1898.

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A series of promotions among works engineers at three manufacturing stations of the Tottenham and District Gas Company, consequent upon the reconstruction of the new works at Ponder's End, were made recently. Mr. C. A. Deas has gone from Southgate to be Works Engineer at Ponders End. He joined the Company when the Hertford Company was taken over in 1931, and is, of course, President of the London and Southern Junior Gas Association this Session. Mr. L. F. Garner, Works Engineer at Hitchin, has succeeded Mr. Deas in a similar capacity at Southgate, and Mr. T. S. Ricketts, who has been Assistant Works Engineer at Hertford, has been appointed Works Engineer at Hitchin. Mr. Garner came from Stevenage when the parent Company took control in 1934, and Mr. Ricketts was one of the Company's own trainees at Hertford. Another promotion is that of Mr. J. A. G. Little, to be Assistant Works Engineer at Southgate. Starting with the Company in 1915, as a Laboratory Assistant, he was from 1921 to 1947 Chemist at Ponders End and Willoughby Lane, and for some time Shift Superintendent.

Obituary

W. B. McLUSKY

Few have served the Gas Industry better than Mr. W. B. McLusky, former Gas Engineer and Manager at Halifax for 27 years, who died there last Thursday, Oct. 30.

Aged 79, Mr. McLusky received many of the profession's honours. He became President of the Waverley Association of Gas Managers in 1899 and again in 1935 when he received the Jubilee Medal. In 1903 and 1906 he was President of the North British Association of Gas Managers, in the latter year being also Convenor for Scotland (with power to call meetings of gas engineers). In 1929 he became President of the Manchester District Association of Gas Engineers. He had also been on the Council of the Institution of Gas Engineers, District Chairman of the British Commercial Gas Association, and for seven years a member of the National Executive Committeee on Charges for Gas, and was made a Fellow of the Royal Society of Arts in recognition of his distinguished services to the Industry.

After training at Port Glasgow, Mr. McLusky was from 1891 Manager of several Scottish gas undertakings. At Kelso the plant was remodelled under his guidance, surplus profits being later applied to a substantial reduction in the price of gas. At Selkirk a large reduction in selling price was obtained by fostering consumption through offering special facilities to consumers. At the turn of the century—June, 1900—he was working strenuously at Perth, the measure of his character and training being revealed by the way he overcame many technical difficulties. In 12 years there, gas consumption had been more than doubled, labour-saving appliances had been introduced, as well as a new retort bench, tar distillery tanks, purifying and electrical stoking plant. Profits increased three times during his stay.

In Halifax, where he went as Engineer and Manager in 1912, the story was substantially the same. Gas sales had a great increase from 796 million cu.ft. in 1912 to 943 millions in 1929-30—the peak year. The Undertaking was maintained as one of the most up-to-date in the country. He retired in 1939, when he was succeeded by his son, Mr. James MacLusky.

In Jubilee year he forecast as likely developments: clean coal, centralization in manufacture where commercially advantageous, and the working together of rural undertakings in a "gas grid" system; purification on the lines originally suggested by William Young, of West Lothian, and Thomas Holgate, of Halifax; standardization of flame volume and calorific value; the linking of mains between towns adjacent to each other; and the development of gas supply in the rural areas between the towns.

Outside his profession, Mr. McLusky lived a full life. He leaves four sons and a daughter.

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The death has occurred at the early age of 29 of Dr. E. Heaton, who was known to many gas undertakings throughout the country through his work for the British Refractories Research Association on the behaviour of refractory materials in the carbonizing industry. Dr. Heaton joined the staff of the Association in 1944, following his training at Leeds University and subsequent post-graduate work on the differential thermal analysis of clays, for which he received the degree of Ph.D.

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The death has occurred of Mr. W. H. Warren, who entered the service of the Gas Light and Coke Company in October, 1905, at the Fulham Works. In December, 1906, he was appointed an Engineer Staff Pupil for three years, after which he became a Junior Assistant Engineer at Beckton. In 1921 he was appointed an Engineer and transferred to Shoreditch. His transfer to Nine Elms followed in January, 1926, and in July, 1927, he was appointed Deputy Station Engineer at that station. In May, 1932, he was transferred to Southall in the same capacity, and in September, 1933, was transferred to Harrow as Station Engineer. His appointment to Southall as Station Engineer followed in October, 1936, and he remained Station Engineer at Southall until his retirement from the Company on Oct. 31, 1946, when he completed 41 years' service with the Company.

The Rochester, Chatham, and Gillingham Gas Company will save 330 tons of coal per annum by equipping the 2,000 gas street lamps in the Medway towns with a clock control electric battery ignitor in place of the usual by-pass.

A **Breakdown** at the municipal gas-works gave Kilsyth another gasless day recently. Householders were warned to turn off gas meters, and candles and spirit stoves were in use for lighting and cooking. The position has now been restored to normal.

A **New Research Department** of Brotherton & Co., Ltd., which centralizes the Company's research activities in one building away from their factories, has been formally opened by the Deputy Lord Mayor of Leeds. The department, which is situated at Headingley, Leeds, has three large chemical laboratories, a workshop pilot plant hed, library, and offices. The total floor space is 10,000 sq. ft.

1947 "JOURNAL" DIRECTORY

In order to keep the Directory information up to date the following alterations and corrections which have been notified during the past month should be noted in the 1947 issue of the "Journal" Calendar and Directory.

Page 22.—Cleveland—G. W. Mahon, *S.*, deceased.
" 72—Swadlincote—H. E. S. Birks, *E. & M.*
" 94.—Lochgelly—A. Nisbet, *G.M. & S.*

Diary

Nov. 6.—Eastern Association of Gas Engineers and Managers: Autumn Meeting, Waldorf Hotel, London, 1.45 p.m. Presidential Address of R. A. Weston, Norwich.

Nov. 6.—Joint Consultative Committee (Domestic Development Committee and S.B.G.I.). Gas Industry House, 2.30 p.m.

Nov. 7.—Gas Companies' Protection Association: Committee Meeting, 5, Victoria Street, London, S.W.1, 2.30 p.m.

Nov. 8.—Institution of Chemical Engineers: "Modern Tar Distillation Plants," A. L. Curtis. College of Technology, Manchester, 3 p.m.

Nov. 10.—Women's Gas Council: Executive Committee, Gas Industry House, 1 p.m.

Nov. 10.—London and Counties Coke Association: Technical Committee, Gas Industry House, 2.30 p.m.

Nov. 11.—British Gas Council, Central Board, Gas Industry House, 2.30 p.m.

Nov. 11.—Institution of Chemical Engineers: "The Purification of Gases in Low Temperature Processes," T. A. Hall and G. G. Haselden. Apartments of the Geological Society, Burlington House, 5.30 p.m.

Nov. 11.—Midland Junior Gas Association, Birmingham: "Hot Water in the Service of Man," George Ewart.

Nov. 11.—Wales and Monmouthshire Junior Gas Association: Paper by S. Armitage.

Nov. 11.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.

Nov. 11.—B.G.C. Gas Salesmen's Circle (Midlands District): Chamber of Commerce, New Street, Birmingham, 2.30 p.m.

Nov. 12.—Industrial Gas Development Committee: Gas Industry House, 9.30 a.m.

Nov. 12.—Scottish Junior Gas Association (Eastern District): Visit to the Gothic Works of Messrs. R. & A. Main, Ltd., Falkirk.

Nov. 12.—Manchester District Junior Association of Gas Engineers: Visit to the Chesterfield Works of the Bryan Donkin Company.

Nov. 12.—B.G.C. Domestic Development Committee, Gas Industry House, 2.30 p.m.

Nov. 12.—Scottish Junior Gas Association: Visit to Gothic Works of R. and A. Main, Ltd., Falkirk.

Nov. 17.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m., Gas Industry House.

Nov. 18.—Joint Meeting of the Chemical Engineering Group and the Physical Society (Low Temperature Group): "A New Process for the Separation of Ethylene from Coke Oven Gas," Dr. P. M. Schuftan. Apartments of the Chemical Society, Burlington House, 5.30 p.m.

Nov. 18.—National Federation of Gas Coke Associations: National Technical Committee Meeting, Gas Industry House, 11 a.m.

Nov. 19.—B.G.C. Salesmen's Circle (West Riding of Yorkshire Section), Great Northern Hotel, Leeds, 3 p.m. Paper, "Survey for Salesmen," by R. J. Gregg, Ascot Gas Water Heaters, Ltd.

Nov. 19.—Eastern Junior Gas Association: Visit to Shredded Wheat Co., and Murphy Radio, Welwyn Garden City, 1 p.m.

Nov. 20.—Midland Junior Gas Association: Half-day visit to the Dunlop Rubber Co., Ltd., Fort Dunlop.

Nov. 21.—London and Southern Junior Gas Association: Meeting, Gas Industry House. Paper by Dr. E. Spivey on "Cooling Operations as Applied to Gas-Works Processes."

Nov. 21.—Scottish Junior Gas Association (Western District): Meeting, Royal Technical College, Glasgow, 5 p.m. Address by Dr. J. R. Campbell on "Carbonization and the Chemical Industry."

Nov. 25-26.—Institution of Gas Engineers: 13th Autumn Research Meeting, London.

Nov. 26.—Western Junior Gas Association: Visit to the G.W.R. Locomotive and Carriage Works, Swindon.

Nov. 27.—Southern Association of Gas Engineers and Managers (Eastern District): "Some Aspects of Distribution Work," Lieut.-Colonel J. A. Gould. Gas Industry House, 2.30 p.m.

SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS

THE Annual General Meeting of the Southern Association of Gas Engineers and Managers was held at the Connaught Rooms, London, on Oct. 28, under the Presidency of Mr. H. J. Escreet (Gas Light and Coke).

Opening the meeting, the **President** expressed his regret at the necessary cancellation this year of the luncheon which usually preceded the meeting. It had in the circumstances been considered advisable to abandon it, but if by the spring the position improved, he hoped it would be possible to hold one then.

The **Secretary,** Mr. J. M. Webber (Croydon), then announced that there were no fewer than 68 apologies for absence. One of them was from Col. Woodall, who was taken ill while in Switzerland. All present would be pleased to learn that the latest news was that he was well on the way to recovery.

Resignations had been received from Messrs. H. Burgess (Sidmouth), F. L. Ball (Snodland), S. E. Knowles (Eastbourne), and J. J. Coe (Arundel). He was sorry to have to report the following deaths: Mr. P. Parrish (South Metropolitan), on May 30, a member since 1910; Mr. R. H. Buxton (late of Wandsworth) on July 10, a member since 1919; and Mr. P. S. Hoyte (late of Plymouth) on Sept. 28, a member since 1901 and President in 1923.

At the proposition of the **President,** seconded by Mr. **R. J. H. Clark** (Plymouth), the Annual Report of the Council for the year ended June 30 was received and adopted.

In moving the adoption of the Statement of Accounts for the preceding session, the **President** called on the Secretary and Treasurer to comment upon them.

Mr. **Webber** regretted that the session had not been as successful from a financial angle as it might have been, owing to several unusually heavy items of expenditure. These included the Summer Meeting at Maidstone, and he reminded members that this was the first time they had had to bear this expense since the war years. The increased cost of printing had also proved a burden, as they had had printed new rules, application forms, &c. He stressed, however, that these items were unlikely to recur for some time and felt that the next session's statement would even things out. The sum of 50 guineas had been donated to the Benevolent Fund of the Institution of Gas Engineers. The motion was seconded by Mr. **R. J. H. Clark.**

Mr. **L. P. Ingram** (Taunton) proposed, Mr. **J. Terrace** (London) seconded, and members indicated their approval of the recommendation of the Council that the following should be elected as members of the Association: Messrs. A. Clarkson, R. J. Plummer, J. Cross, A. A. Hall, L. J. Clark, and Dr. F. R. Weston (all of the Gas Light and Coke), C. D. Pressley (Dover), C. J. B. Sawbridge (Eastbourne), J. O. Branson (Sidmouth), F. White (South Metropolitan), W. E. Medhurst and S. C. Herbert (South Suburban). Nine of the new members were present at the meeting and were welcomed by the President.

On the proposition of Mr. **F. Dawson,** seconded by Mr. **J. H. Dyde** (Slough and Uxbridge), Mr. L. P. Ingram was elected the Association's Representative on the Council of the Institution of Gas Engineers for the next session.

The **President** then made a presentation to Mr. F. Dawson as a token of appreciation of his services as President during the preceding session. Mr. Dawson, he said, was well know to all present and so well liked that it was hardly necessary for him to extol his merits, but it was fitting that he should outline briefly the work he had done for the Association. Mr. Dawson became a member of the Association in 1935 and his rapid rise to the position of President—11 years was well below the normal period of membership before being made a President—and his appointment to that position when still comparatively youthful—were proofs of the respect and esteem in which he was held by his fellow-members. His well merited promotion in the Industry proved also how much his ability and keenness were appreciated by the boards of the companies in which he had served—indeed, the two things went together since one's professional brethren were usually at least as critical of one's ability as those under whom one served. The Association was indebted to Mr. Dawson for the excellent way in which he had conducted its business during the past year, for his inspiring Presidential Address and last but by no means least, for the most enjoyable entertainment and lavish hospitality which he provided at the Summer Meeting at Mill Hill. In his Presidential Address reference was made to the formation of the Gas Engineers' National Guild. Mr. Dawson had done very good work in the organization of that body, and it would be remembered that at the Spring Meeting Mr. Dawson, with Mr. Ingram, were appointed as the representatives of Guild members in the Association on the Council of the Guild. He was pleased to see that Mr. Dawson was now Vice-President of the Gas Engineers' National Guild.

On the technical side, he would like to mention the survey which Mr. Dawson had carried out on his Company's area to determine the results of wartime maintenance—or lack of maintenance—on domestic appliances. This was most useful work which should be of great value to other undertakings. Mr. Dawson was also most interested in the welfare of those employed by his Company—a typical example was his organization of the Midgas Holiday Camp for his apprentices. It was with great pleasure that he wished him to accept a momento of a most distinguished year of office.

Replying briefly, Mr. **Dawson** said it was difficult to find adequate words to voice his thanks. He had broken away from the traditional salver and he hoped that his choice of an H.M.V. gramophone would meet with the approval of members; it would give many hours of pleasure to his wife and family as well as to himself. He also expressed his thanks for the continued loyalty he had experienced during his year of office. At first he had grave misgivings whether he could maintain the traditionally high standard, but his task was made easier by the encouragement he had received from everyone and the warmth of the friendships he had made. He also extended his personal thanks to Mr. Webber, who was ever courteous and helpful, and without whose help he could not have succeeded. In conclusion, he would like to assure Mr. Escreet that in his coming year of office, he could rely on the same support, and hoped he would enjoy his year of office.

Mr. **Escreet** then delivered his Presidential Address.

A vote of thanks to him was voiced by Mr. **F. M. Birks** (Gas Light and Coke), who said he had had a quarter of a century in which to appreciate the great deal of work he had done both for the Industry and for the great Company it was their honour to serve. He would like to point out that only those who knew him really well could appreciate his many sterling qualities. It had been his privilege on more than one occasion to see his reaction under stress and great difficulties and he could assure them Mr. Escreet had always been absolutely imperturbable. He therefore had the greatest pleasure in proposing this vote of thanks for his Address, which had been of the very high standard that one expected of him, and in wishing him a happy time as President.

Mr. **F. E. Cox** (Tiverton) seconded, saying that although he could not claim such a long relationship, what he could claim led him to the conclusion that they had elected the right man. The President's genial conduct at the meeting showed how well suited he was to the office.

The meeting concluded with an announcement that the Spring General Meeting would be held on May 25.

MEETING OF EASTERN DISTRICT

The First Meeting of the 1947-48 Session of the Eastern District of the Southern Association of Gas Engineers and Managers was held at Gas Industry House, Oct. 21.

Mr. **J. H. Dyde,** the retiring Chairman, took the opportunity to thank the members for their support during his term of office, and especially those who had presented Papers. He had a special word of thanks also for the Hon. Secretary, Mr. J. M. Webber. Inviting his successor, Mr. Escreet, to occupy the Chair, he said that in his hands the affairs of the Eastern District were bound to flourish, as would those of the Southern Association under his Presidency.

Mr. **H. J. Escreet** formally occupied the Chair, and first paid tribute to Mr. Dyde for his great efforts, whereby the Eastern District had enjoyed so successful a session. He commented on Mr. Dyde's wide knowledge, and thanked him for having done so much for the District, particularly bearing in mind his activities as Director of a very large group of the South Eastern Gas Corporation and in connexion with the new Education and Training Scheme for Salesmen.

It was stated that Lieut.-Colonel Wright, of the Uxbridge Company. who was stricken with infantile paralysis in June, was still unable to get about, although he was improving. He had written asking that his kind regards be conveyed to all the members of the Eastern District. He had agreed to present a Paper on Sales and Service Organization in February; in spite of his illness, he was preparing the Paper and had every hope of being able to present it. The Chairman said they were all more than grateful to him for tackling such a matter in the circumstances.

Mr. **J. W. Townsend** (Tunbridge Wells) said that at an Economy Conference at Tunbridge Wells during the previous week, attended by gas and electricity engineers and members of local authorities in the Region, the new Minister of Fuel and Power had given an Address and had subsequently answered questions. One question of supreme importance to the Gas Industry was raised, and Mr. Townsend was not surprised that both the national and the local Press had ignored it. The Town Clerk of Hythe had asked the Minister what should be the policy of local authorities responsible for new housing, in view of the very grave national position of electricity; should they put in gas or electric cookers? The Minister had replied that, provided the gas undertakings could take the load, there was no doubt that in the

national interest gas cookers should be installed in new houses.

Mr. **G. le B. Diamond** (Rochester) felt that the matter should be considered from the local point of view. Many gas undertakings could not take more load and automatically the matter would sort itself out as time proceeded. A number of electricity undertakings would not be able to take additional load in the future until more plant was available. But he was thinking beyond that, and felt that the time was rapidly approaching when someone had to get down to brass tacks and, in the national interest, find some means of balancing the loads as between one fuel and another. It was of no use putting up additional power stations, and thinking that the load would be automatically there, because it would not.

Colonel **J. A. Gould** (South Suburban Gas Company) said the Lewisham Borough Council had recently passed a resolution that no gas should be installed in future permanent houses.

The **Chairman** commented that perhaps some people thought that when the industries were nationalized they could sort things out without commercial difficulties.

Mr. **G. le B. Diamond** (Regional Controller, Ministry of Fuel and Power South-Eastern Region, Director of 10 Companies for the South-Eastern Gas Corporation, and Engineer and General Manager of the Rochester, Chatham, and Gillingham Gas Company) presented a Paper dealing with the Kent coalfield, in the course of which he speculated on the future of the coalfield in relation to the carbonizing industries.

"UNTIMELY AND DANGEROUS"—COLONEL CARR ON GAS NATIONALIZATION

In Manchester on Wednesday of last week, at a luncheon at the Grand Hotel, Colonel W. Moncrieff Carr, O.B.E., T.D., Managing Director and Acting Chairman of the United Kingdom Gas Corporation, Ltd., addressed a gathering of engineers and managers and executives of the gas undertakings controlled by the Corporation. The occasion, in view of gas nationalization, was important and impressive, and Colonel Carr's comments on the situation will, we know, be closely studied.

THE toast "The United Kingdom Gas Corporation" was in the hands of Mr. **A. McDonald** (General Manager of the York, Harrogate Group of Companies), who said that the Corporation had been in existence for 12 years, and throughout the period had been one of no few difficulties. There had been the war years only to be followed by grave shortages of labour and materials, but in spite of all it could truly be claimed that the United Kingdom Gas Corporation had made its mark. The policy of the Corporation had been one of the most progressive—a policy based essentially on service to the consumer at a reasonable price. To achieve the results integration in the form of grouping had been carried out—not haphazard integration, but integration following extensive investigation. One outstanding achievement, a shining example, was the West Riding of Yorkshire Group; and he should mention that individual undertakings had been built up often at the expense of dividends by ploughing back profits. The officials of the individual companies had been given every freedom in the operation of their undertakings while the Central Administration had been set up to give expert advice in every branch of the Industry's activities. All the work had been aimed at the benefit of the consumer. They were aware of their deficiencies. For several years they had been forced to improvise because of war conditions and subsequent shortages, but every encouragement had been given to them by the Corporation. In conclusion he felt that under nationalization the difficulties to which he had referred would be made greater by remote control.

Individual Responsibility Essential

Colonel **Carr,** responding, said he felt like a parent on a great family occasion, and he was indeed proud to think that he had helped in the building-up of such a united organization within the Gas Industry. He thought, too, that they had every reason to be proud of their efforts in a great public service. They had, he could say without hesitation, improved the undertakings under their control from the day those undertakings were acquired; and this had primarily been due to two reasons: First, it had been left to those responsible for the conduct of individual undertakings to exercise their initiative to the full and fully to shoulder their responsibilities. Secondly, it had been a basic consideration that public gas supply was essentially a local matter, that everything depended on the relationship between the supplier and the consumer, that in fact a gas undertaking should be regarded as an individual by the public it served, on a personal basis and not as an abstract entity. Problems, continued Colonel Carr, had been dealt with on the spot, always with the background desire to improve and cheapen gas supply. They were now on the eve of nationalization of gas, and he could only hope that this aspect of consumer service would be the first consideration of the Government.

Let them consider for a moment the working of the United Kingdom Gas Corporation. True the Corporation owned the shares in its individual companies, and therefore to that extent it controlled them. But he could not emphasize too strongly that the various groups and the several undertakings were complete entities. The Corporation provided certain services which the small undertaking working on its own simply could not command, but the Corporation had never taken the responsibility from the shoulders of the man on the spot; the reverse was the case, responsibility was firmly placed and individual expression had been given full rein. Each manager had to answer for his balance sheet—in short, for the custody of his undertaking. The Corporation had extended its sales 140% in 10 years. Had there been no war, there was no doubt at all that they could have extended 400%. The demands for gas were enormous, both in the domestic and in the industrial sphere; and if industrial targets were to be reached these demands would be greatly increased. Industry was crying out for heat on tap; industrial progress depended on heat applied efficiently and economically. Equally the most efficient and most economical heat service was needed in the home; and the Gas Industry, through gas and coke, could give this service and should be granted priority.

He could claim that there had been no bureaucracy in the operation of the United Kingdom Gas Corporation; and he suggested that no brake ought to be put on the progress of a great public utility—gas. They were, he added, faced with nationalization at a time of the greatest economic and fuel crisis which the country had known, and they must have faith in the part which the Gas Industry could and should play in helping to overcome current difficulties. Everyone engaged in the Industry must see clearly his purpose in the economic recovery of the country.

A Solution to the Fuel Crisis

"Our fuel crisis," Colonel Carr continued, "would not only be solved but millions of tons of coal would be released for export, thus immensely helping our economic recovery, if only the bituminous coal now burnt in the raw state were carbonized before use into gas and coke. Every ton of coal carbonized in the Gas Industry does the work of two tons burnt in the raw state, for the overall efficiency of carbonization is more than twice that achieved by raw coal. This is recognized by all authorities, including the Government's fuel advisers The dilemma is whether to allot absolute first priority to schemes for expansion which will absorb large quantities of steel, refractories, labour, and finance, but will produce a permanent return in the shape of far greater availability of fuel, or whether instead to concentrate first efforts on immediate exports.

"It is, I suppose, a question of delicate balance, but I suggest that there is no real dilemma here. To export steel that could be used to release more coal is unsound economics and is only putting off the evil day when we simply must have enough fuel for industry and for export also or go under. My contention is that the economic utilization of coal is an absolute first priority for national recovery, and I urge a great acceleration in plans for expansion in carbonization facilities as a key to quick recovery based on the universally wanted export under present world conditions—export of coal."

Colonel Carr urged the managers of the United Kingdom Gas Corporation gas undertakings not to let uncertainties concerned with the proposal to introduce a Gas Nationalization Bill divert them in any way from their vital task of maintaining gas supplies during the coming winter and of pushing ahead with all possible speed with the schemes of expansion already authorized.

"Stretched to the utmost as it is to cope with the demands made on it in the present critical times," he concluded, "the Gas Industry must deprecate as untimely and dangerous the introduction of a Gas Bill at the threshold of the greatest economic crisis in our country's history. Now should be the time to leave well alone, at least while the crisis lasts, and not to introduce all sorts of doubts, disharmonies, and controversies into a vital public utility which has a fine record of efficiency and has not failed the public once during the two fuel crises we have experienced in the past year."

Mr. **W. Hodkinson** (General Manager, United Kingdom Gas Corporation) proposed the toast "Constituent Companies," and in doing so suggested that U.K. might well have pointed the way to the nationalization proposals. But whereas U.K. had built up their organization on existing foundations, providing tools and assistance to enable individual undertakings to give better service, the proposals of the Ministry of Fuel and Power were in the nature of a new organization without experience.

Mr. **R. Turner** (General Manager and Secretary of the Bedford Group of Gas Companies) responded.

COAL OUTPUT FALLING

Last week Sir Stafford Cripps warned the nation that coal production week by week is failing to provide the minimum needed to meet the coal budget on which all the Government plans for this winter are based. The coal budget requires a minimum output of 3,900,000 tons of mined coal in every normal working week. This allows for low production over Christmas and the New Year, but makes no allowances for strikes and other stoppages. Output during the week ended Oct. 25 was only 3,671,900 tons, and the highest figure reached in the previous four weeks was only 3,794,000 tons—more than 100,000 tons below the minimum for safety. "We have not reached the production levels necessary for winter supplies, and so our whole production programme is still to that extent in jeopardy," Sir Stafford said. He added that in recent weeks men had been recruited to the coalfields at a rate of more than 1,700 a week, but that recruitment had not kept pace with wastage and the number of workers on the colliery books had fallen from 719,000 in July to about 715,000.

Sir Stafford also gave warning that we could not expect opencast coal production, which has been running at the rate of about 250,000 tons a week, to continue at this level through the winter. Opencast coal-getting depends to a great extent on the weather, and Mr. Gaitskell, in preparing the coal budget, estimated the yield from opencast workings at 160,000 tons a week.

During the week under review the tonnage lost through disputes, holidays, and other interruptions was high in many parts of the country, but was heaviest in Scotland (138,530 tons) and South Wales (12,000 tons). The tonnage of coal stocks at gas undertakings advanced by 27,000 to 2,723,200, and at electricity stations by 20,000 to 4,211,700. With the coming of colder weather consumption increased, gas production accounting for 436,000 tons (16,000 tons more than the previous week) and electricity generation for 549,500 tons (an increase of 33,000 tons).

INSTITUTE OF FUEL

There are now seven regional sections of the Institute of Fuel in addition to the parent body in London, in all of which discussion meetings are held in the winter months. The syllabuses of the 1947-48 session are now before us. All are complete except that of the newly-formed North Eastern Section, which is to be opened by an Address by Sir Ernest Smith, the subject of which is not announced. In what, then, is the Institute of Fuel to be interested this winter?

Dr. A. C. Maries is to discuss in London our reserves of coal. Nothing can be of greater interest than that. The recent Fuel Research Board's Paper on the subject was somewhat indigestible. It is time it was brought down to earth. Dr. R. A. Mott is dealing with a branch of the subject on which he is an authority, that of coal assessment. It is allied with the long expected price structure which is to be presented to the East Midlands by Dr. Grumell. Coal preparation and cleaning are the subject of Papers by Mr. S. Lynch and Mr. Hague, while Dr. Davies is to deal with the recovery of pyrites from colliery refuse. Efficiency in the use of fuel is to be treated by Mr. S. N. Duguid in a Paper with the title "The Fight for Fuel Efficiency" to be presented to the East Midland Section, and presumably the same subject will take up a good portion of the time of the Brains Trust to be held by the Yorkshire Section in February on "The Intelligent Use of Fuel." A Paper on the Notts and Derbyshire coalfield—"Present and Future"—by Mr. A. Dawes and Dr. G. Coles in the East Midland Section in March, should be the first of a series of discussions eventually covering all the sources of our basic mineral wealth. So far then nine out of approximately 32 of the discussions to be staged by the Institute will be concerned with the fundamentals of fuel in Britain.

Three Papers will deal with oil. That by Mr. J. Sinclair Kerr, discussing the effect on fuel economy of conversion from coal to oil in steel-making, is to be read to no fewer than three Sections. "Oil Firing Practice" is the title of a Paper by Mr. S. W. Bertinshaw, to be presented to the North Western Section, while one on oil-firing is promised to the East Midland, and oil refining is to be discussed in Scotland by a representative of one or other of the companies engaged in this industry. Pulverized coal finds a place in the programmes of three sections, the most useful promising to be a presentation to the South Wales Section by Mr. E. McCabe of the results of the conference held last summer on this subject. And perhaps we may join with that a Paper on the combustion of low grade fuels with special reference to Continental practice to be given by Dr. J. H. Bock to the North Western Section.

Then we have a series of Papers dealing with particular pieces of fuel-using apparatus. Dr. A. C. Dunningham is to discuss the thermal efficiency of gas producers and the relative merits of producer gas and stoker firing for chemical and other plant. Prof. L. Aitchison will address the Midland Section on fuel economy in the non-ferrous metal and light alloy industries; Dr. Fielding, on industrial and domestic space heating, in South Wales; and Dr. F. M. H. Taylor, the Yorkshire Section, on heating and ventilation. Particular problems are to be dealt with by Dr. Townend, on the down-jet furnace, Dr. E. G. Ritchie, on the performance of shell-type boilers with an account of the work of the R16 Committee of B.C.U.R.A., Dr. H. E. Crossley, on external deposits on the heating surfaces of boiler plant, Mr. E. Watkinson, on the recirculation of gases, Mr. S. J. Clifton, on boiler house control, and Mr. M. Southern, on high temperature furnaces.

On the severely scientific side we are to have Dr. H. R. Fehling on data on combustion with oxygen and oxygen-enriched air (Part I. Thermodynamic data and their implications for high temperature heating processes)—in South Wales in December and in London in January—Dr. Townend on "Some newer fields in Combustion," and Dr. A. L. Roberts on the transfer of energy from flames to solids.

And finally there is to be another joint discussion on smoke abatement in Manchester, when the Urmston district heating scheme will be described, and a lecture by Prof. Oliphant to the Midland Section in March on "Atomic Energy as an alternative to Fuel."

Ministry of Fuel and Power sanction has been obtained for the installation of a high pressure gas storage system at Earl Shilton, Hinckley, Leics.

Darwen's Proposed £500,000 district heating scheme to provide mills, shops, and houses with central heating will be taken a stage further at a special Council meeting on Nov. 17.

Tenders are being obtained by Middlesbrough Corporation for the supply and erection of a gas dehydration plant with a capacity of 15,000,000 cu.ft. of gas per day, and a gas boosting plant with a capacity of 400,000 cu.ft. per hour.

Seventy Members of the outdoor staff of the Sheffield and District Gas Company attended the first of the new winter lectures in the Company's own cinema last week to hear Mr. T. W. Daniels, of Electrolux, Ltd., give an instructional talk on "The Repair and Maintenance of Gas Refrigerators."

Shipley Council have applied to the Ministry of Fuel and Power for approval of a programme to renew and extend the carbonizing plant at the Shipley Gas-Works. The Council have decided to defer consideration of a Ministry recommendation that Shipley should secure from Bradford Corporation a balance of gas needed if certain increases were maintained.

The Attention of members of the Institution of Gas Engineers is drawn to the following two public lectures of King's College, London, which will be given in the Department of Civil and Mechanical Engineering, King's College, Strand, London, W.C.2, at 5.30 p.m. Both lectures have as their subject "Mechanical Aids to Improved Thermal Operations." Admission is free and no tickets are required. On Monday, Nov. 10, a lecture will be given by Mr. L. J. Clark, B.E.M., and will deal with special considerations in the production of gas for towns. On Monday, Nov. 17, a lecture will be given by Professor S. J. Davies.

Glasgow Gas Department have announced that gas pressure might have to be reduced owing to the continuation of the coal strike. Gas-works have about four weeks' stock of coal, but coke ovens which have only a few days' coal supply are taking precautions by reducing their throughput of coal, thus allowing less gas from this source. The Department are depending on the maintenance of coke oven gas supply because of plant repairs at the gas-works, and this position was not in any way eased by a mechanical breakdown which occurred in a water gas plant. Although this had been repaired, the result was that the stock of gas in the gasholders was below the safety margin. Consumers have been urged to economize.

Leeds Gas Department is shortly starting a cookery class for men, which will be similar to the six-lecture women's course designed for the "newly weds," to make sure they do not waste rations by experiments. The object of this class is to teach the basic principles of cooking so that the fully-fledged cook can prepare without qualms a Sunday dinner (including Yorkshire pudding). He will be taught methods of boiling, roasting, frying, and stewing for two and a half hours each night, shown how to prepare vegetables and how to plan a pantry so that "everything is within reach." In addition he will learn how to prepare attractive meals for an invalid. Students will have to share the official demonstrating ration, which is 2d. worth of meat, 2 ozs. margarine or cooking fat, 1 oz. sugar, ½ oz. preserves, 2 oz. cheese, ½ pint of milk, ½ oz. dried egg, ¼ tin dried milk, ½ point and 1 B.U.

The Expansion of Bottled Gas Services in Scotland has been emphasized by the necessity to close down certain gas-works now rendered unprofitable by the circumstances of heavier costs and replacement difficulties. Two important units are presently marketing bottled or packaged gas, with very great success, in Scotland, and their activities would have been extended even wider but for the prevailing shortage of steel for containers, equipment for servicing, and the other various enforced limitations on the utilization of this type of gas. In Abernethy, street demonstrations have been staged by Rural Gas, of Perth, to show how easily the product could be introduced in an emergency such as that facing this town, where the closure of the gas-works has resulted from economic pressure. The Town Council is backing this development and has promised speedy delivery of equipment where it is adopted.

DETERMINATION OF HYDROCYANIC ACID IN CRUDE OR IN REFINED COAL GAS*

By H. F. TAYLOR, F.R.I.C.,

Research Department, Hardman and Holden, Ltd., Manchester

HCN in coal or coke oven gas is determined by passing the gas over a moist mixture of nickel carbonate and sodium carbonate spread over granular cellulose pulp. On purified gas the HCN is absorbed as a double cyanide, and is determined by distilling with dil. H_2SO_4, collecting the HCN evolved in caustic soda solution and titrating with silver nitrate. On crude gas, since some thiocyanate is formed in addition, an alkali extract of the product is distilled with dil. HNO_3, when the HCN in both thiocyanates and cyanides is liberated and absorbed as before in caustic soda solution.

The methods described for the determination of HCN in coal gas were put forward as the result of laboratory work and practical experience at gas-works, as the most accurate and convenient for the purpose in the opinion of the Author.

Both methods are based primarily on the test for HCN in purified gas worked out by H. E. Williams, and briefly described in 1931 in a Paper read to the Manchester District Association of Gas Engineers.(1) This test is apparently not well known to-day, probably because the account of it formed only a part of a very comprehensive Paper on the dry purification of coal gas by oxide of iron, and it was not recorded in the indexes of the journals reporting the Paper, except under the general title of purification by oxide of iron, nor is it given in the American Gas Association's book on dry purification edited by Seil and published in 1943.

Williams's method depends on the property of HCN of reacting with a mixture of nickel carbonate and sodium carbonate to form a double salt $2NaCN.Ni(CN)_2$, or $Na_2Ni(CN)_4$, which is not decomposed by carbon oxide. On distillation with dilute sulphuric acid this salt evolves all its HCN, which may be collected in caustic soda solution and titrated with silver nitrate.

Williams's method was intended for use on purified gas, and has been extensively used for this purpose since 1931 with only minor modifications. For crude gas the Author worked out a modification (after proving that the double cyanide was not decomposed by H_2S) which corrects the inaccuracy which would be caused by the formation of thiocyanates if the original test were applied to gas containing H_2S. The modification depends on the fact that at least 98% of the HCN in thiocyanates can be recovered as HCN by distillation with dilute nitric acid under suitable conditions. This reaction, which has been used commercially,(2) was studied with pure thiocyanate solutions of known strength; in a series of 11 distillations with concentrations of nitric acid, sp.gr. 1.42 of 2½% to 10% by volume, in the mixture distilled, recovery of 97.9% to 99.5% of the HCN present was achieved. The average recovery was 98.8%. A very small loss of HCN is known to occur whenever cyanides are distilled with acids,(3) depending on the concentration of the acid and the time-contact, and as the above degree of accuracy was considered sufficient for the purpose the cause of the small loss was not pursued further, beyond a few determinations which showed that the presence of nickel and other compounds likely to be present in the reaction mixture from the gas tests did not have any effect on the results. The dilute nitric acid also replaces the sulphuric acid of the original test, in liberating the HCN from the complex sodium nickel cyanide.

In six comparison tests in which tubes of nickel mixture were run in parallel with polysulphide determinations on crude coal gas, the results by the nickel method were about 2 grains per 100 cu.ft. lower than the polysulphide results (on gas containing about 50 grains HCN per 100 cu.ft.).

Among the advantages of the nickel methods are the fact that the duration of the tests may be varied without difficulty from a few hours to a week or more (the capacity of the tubes is high and a regular gas flow is much more easily obtained than in tests involving the use of bubbling bottles); the apparatus is simple, no purifier being necessary on crude gas before the meter; the progress of the reaction may be followed by the colour changes in the tubes, and in the case of purified gas this change may be used to obtain a roughly quantitative visual test after the mixture has been standardized by a few distillation tests.

Although the tests are comparatively simple the details necessary for their successful and convenient application have taken some time to work out, and it has therefore been thought worthwhile to record these details.

Preparation of the Nickel Mixture

Sawdust was originally used as the carrier for the nickel carbonate—sodium carbonate mixture. In a search for a less variable body we have tried pumice, asbestos, and various types of paper-pulp, and have come to the conclusion that a short fibre paper-pulp, as used for white blotting paper, is the most satisfactory, because of its large surface area, high water absorptive properties, light colour, and chemical purity.

The Quantities and Method of Preparation recommended are as follow:

White blotting paper, torn into shreds	50 g.
Nickel sulphate, pure crystal	50 g.
Sodium carbonate, pure anhydrous—	
(*a*)	25 g.
(*b*)	20 g.

The blotting paper is added to about 1½ litres of boiling water and mechanically stirred for an hour or two until pulped.

The nickel sulphate and the 25 g. of Na_2CO_3 are dissolved separately in about 200 ml. of water, mixed and the sludge of nickel carbonate added to the pulp and mixed thoroughly with it.

The product is filtered through a large Buchner funnel, without paper, about 7 in. diameter with perforations as small as possible, and the filtrate poured back until clear. Very little suction is needed. Excess water is finally removed by suction.

The cake is removed from the funnel, broken up, and allowed to dry substantially by exposure overnight in a warm place (at about 30°-40° C.); it is then broken up and rubbed out into a fibrous condition and placed in a 2 litre enamelled pan or strong glass beaker.

The second portion of sodium carbonate (20 g.) is dissolved in 85 ml. of water and added from a burette or dropping funnel to the nickel mixture, distributing as evenly as possible by rotating the container and by stirring. The product will be rather wet for use (unless it is expected to be used in conditions under which it will dry out) and it is exposed to the air for a few hours in a warm place until judged to be of suitable water content—*i.e.*, moist but not sloppy; after which it is broken up and well mixed. It should preferably contain 40%-50% of moisture.

The product is filled into glass tubes, usually 15 in. long by ½ in. diameter, on to a cotton wool plug, being consolidated partially by tapping the tube on the bench. It has been found that each inch of 0.5 in. diameter tube filled in this way, which has been turned from green to yellow by the action of HCN in gas, corresponds to very roughly 2 grains of HCN, the exact figure depending on the conditions of packing, rate of gas flow, &c.

Use of the Tubes for the Determination of HCN in Purified Coal Gas

A tube of the nickel mixture about 15 in. long by ½ in. diameter is connected by a glass tube to the gas to be tested, in such a manner that the gas passes downward through the vertical or inclined tube (to avoid possible loss of condensate containing the nickel sodium cyanide). The other end of the tube is connected to a condensate bottle, a regulating tap, and a gas meter. If the gas is not under much pressure it is often unnecessary to use the regulating tap and the flow will then be much less likely to fall off. Gas is passed through at a speed of up to 3 or 4 cu.ft. per hour, until a suitable quantity (*e.g.*, 25 cu.ft. or more) has passed, or until not more than three-fourths of the nickel mixture has changed colour. If the gas flow is rapid the change from green to yellow will not be sharply defined; this does not affect the result of the subsequent distillation tests, but it interferes with the approximate visual test.

The contents of the tube are then emptied into a beaker, transferred to a 1,000 ml. round-bottomed flask and made up to about 400 ml. with water. A few drops of methyl orange are added and then dilute sulphuric acid until acid, together with a little excess acid (equivalent to about 2 ml. of concentrated acid).

The flask is connected to a condenser (most conveniently of the short double-surface type), the outlet of which dips into about 30 ml. of 10% caustic soda contained in a beaker standing on a block of wood. The mixture is distilled rather rapidly, over a piece of thin wire gauze, until about two-thirds have passed over. The condensate will be sucked part way up the condenser; if it seems to be rising too near to the top, air is let in by lowering the beaker temporarily. A second fraction of about 50 ml. is then collected in about 10 ml. of caustic soda.

A few ml. of 10% potassium iodide solution are added to the distillates, which are then titrated with N/10 silver nitrate in the usual way—until the first appearance of opalescence (Liebig's method). If more than about 4 grains of HCN are expected to be present the distillate should be made up to a known volume and a aliquot portion titrated.

* From a Paper to the Manchester Section of the Society of Chemical Industry.

1 ml. N/10 $AgNO_3$ is equivalent to 0.0054 g. HCN or 0.0832 g. HCN.

Notes:

(1) If the distillation is conducted slowly, "bumping" will occur, owing to the settling out of the cellulose on the bottom of the flask. Slow distillation also favours slight decomposition of the HCN.

(2) The second distillate should not require more than 0.3 ml. of N/10 $AgNO_3$. If more than this is required, which will happen if a good deal of HCN is present, more water is added to the residue in the flask and further fractions are distilled over.

Determination of HCN in Crude Coal Gas

(Modification by H. F. Taylor of H. E. Williams' method, to enable gas containing H_2S to be tested.)

The same mixture is used, but instead of the one tube, two or three tubes 15 in. long by ½ in. diameter, each containing a 12 in. length of the mixture, are connected in series by glass tubing to the gas to be tested, the outlet end of the tubes being connected directly to a gas meter (no H_2S will pass the tubes). Two tubes will suffice for 10 cu.ft. of gas; three (or a ¾ in. and a ½ in. diameter tube) should be used for larger amounts, particularly if the gas is to be passed at more than 1 cu.ft. per hour. Ammonia is removed from the gas prior to the test, by a wash bottle adjacent to the main (see Note 6).

Gas is passed through at a rate of not more than 2 cu.ft. per hour, as a rule. If a short test is desired, higher speeds might be used for an hour or so, and the completeness of the absorption could be tested by determining separately the HCN, if any, in the latter portion of the mixture—which should show no colour change. The test may be left on for a week, if desired, at about 0.1 to 0.2 cu.ft. per hour. Regulation of the flow-rate is best made by a glass tap immediately before the meter.

When the absorption period is completed the tubes (including a length of not less than 3 in. of completely unchanged mixture) are scraped and rinsed out into a beaker.

Determination of HCN in the Used Nickel Mixture

The subsequent washing to extract the cyanides and thiocyanates must be thorough, as the cellulose is very absorbent and difficult to wash. Details are therefore given of a procedure found suitable.

1% caustic soda is used for the washing process; if water is used, nickel sulphide usually passes through the filter-paper as soon as the mixture becomes neutral.

For two ½ in. tubes of the mixture, 1,000 ml. of boiling 1% caustic soda are used. The mixture is digested for ½ hour with 200 ml. of 1% soda, in a water-bath at the boil, with frequent stirring, the liquor decanted off through a Buchner funnel, a second wash by decantation given, the mixture again stirred with hot soda, transferred to the funnel and washed with the remainder of the 1% soda in about six washes, each followed by pressing and draining with suction. The combined washes are made to 1,000 ml.

Apparatus for the Distillation with Nitric Acid

This consists of a round-bottomed flask of 700-1,000 ml. capacity, fitted with a rubber stopper and a glass tube (about 8 mm. bore) leading to the top of a condenser, preferably of the double-surface type, fixed in a vertical position. An intervening rubber joint is of thick-walled rubber tubing, as the nitric vapours soon destroy thin rubber tubing. From the bottom of the condenser a tube leads to the bottom of a cylinder containing 50 ml. of 10% caustic soda. A cylinder about 1¾ in.-2 in. diameter and 8 in. or 9 in. high is suitable, as it will give a reasonable depth of liquid at the start to absorb the HCN from the rapid current of nitrogen oxides which is generated by the oxidation reaction. After the first 50 ml. of distillate have been collected, evolution of gas, except HCN, almost ceases, and any type of receiver may be used for further fractions if the first receiver is not large enough, a little caustic soda being placed in it beforehand.

Method of Conducting the Distillation

A suitable aliquot portion of the 1,000 ml. of extract is placed in the R.B. flask (*e.g.*, 250 ml. if 10 cu.ft. gas containing an estimated 50 grains HCN per 100 cu.ft. had been passed). 50 ml. of 10% caustic soda are placed in the receiving cylinder. Ordinary concentrated nitric acid equal in volume to one-tenth the volume of the aliquot (*e.g.*, 25 ml.) is mixed with an equal volume of water and added to the flask, which is at once connected to the condenser. The mixture is heated on a wire gauze until the oxidation process begins, as shown by bubbling and evolution of red fumes (at about 80° C.), when it is advisable to remove or reduce the flame for a few minutes. When the action subsides the flame is turned up and when the evolution of gas has substantially ceased the mixture is distilled over a full flame until about two-thirds have distilled over, after which a further check fraction of about 50 ml. is collected. A trace of sulphur distils over with the steam, but it has been found that this does not interfere with the titration.

The distillates are titrated in beakers with N/10 $AgNO_3$ (adding a few ml. of 10% potassium iodide) until the first appearance of opalescence (Liebig's method).

1 ml. N/10 $AgNO_3$ is equivalent to 0.0054 g. HCN or 0.0832 grain HCN.

Notes

(1) If any doubt is felt about the efficiency of the removal of the sodium nickel cyanide from the cellulose pulp by the caustic soda washes, the residual cellulose or a portion of it may be distilled with dilute sulphuric acid in the same apparatus, using a flask of 1,000 ml. capacity. Only a part of the nickel sulphide will be decomposed, but it will be necessary to desulphide the distillate, and for this 0.5 g. of pure lead carbonate ground with water is added and stirred until the mixture no longer stains a lead paper. The solution is then filtered and titrated with N/10 silver nitrate.

(2) As the titration end-point is reversible, a portion of the distillate may be removed and added back after the bulk has been titrated, to avoid risk of over-shooting the end-point.

(3) As the gas may be under considerable pressure and the regulating tap is between the tubes and the meter, the effect of the smallest leak—*e.g.*, along the seam of the rubber tubing—will be magnified, and should be tested for beforehand by closing the outlet of the tubes, interposing a bubble-bottle at the inlet and turning on the gas.

(4) Very occasionally a little nickel sulphide passes the filter-paper in the extraction of the mixture with 1% caustic soda. In this case the final distillate will need de-sulphiding, and for this lead carbonate may be used, as in (1). The presence of H_2S in the distillate may be detected by a lead paper.

(5) A trace of HCN (equivalent to 0.15 ml. N/10 $AgNO_3$ in several tests) occasionally passes the caustic soda solution in the distillation test. If this is considered important a more elaborate type of absorption apparatus should be used.

(6) Excessive ammonia and oxygen in the crude gas were found to remove a large proportion of the HCN from the gas (presumably as AmCNS) when such gas was accidentally allowed to come in contact with condensate running down the side of the gas main or formed in the long connecting tubes leading to the nickel mixture. The sampling tube should pass several inches into the main, and ammonia should be removed by a wash bottle containing 10% H_2SO_4 adjacent to the main.

The writer is indebted to Messrs. Hardman & Holden, Ltd., for permission to publish this Paper.

References

(1) "Oxide of Iron Purification of Coal Gas," R. H. Clayton, H. E. Williams, and H. B. Avery, "Gas Journal," 1931 (196) 311.
(2) "The Raschen Process for the Manufacture of Cyanide," J. T. Conroy, J.S.C.I., 1899, 432.
(3) "Determination of Cyanides by Distillation from Sulphuric Acid Solution," A. Pagel and W. Carlson, J.Am.Chem.Soc., 1932, 4487.

INAUGURATION OF DUNDEE W.G.C.

A meeting of representatives of the various women's organizations in Dundee was held in the Gas Department Showrooms, Commercial Street, on October 22.

Councillor E. S. Douglas, Convener of the Gas Committee, presided over a well-attended meeting, and an address was given by Miss D. W. Pidsley, Assistant Secretary of the Women's Gas Council, who spoke of the activities of existing branches and gave advice on the formation of a new branch. Tea was served by lady members of the Gas Department staff, after which it was unanimously resolved to form a Dundee Branch of the Women's Gas Council.

The following office bearers were elected for the ensuing season: President, Mrs. E. S. Douglas; Secretary, Miss M. Smith; Committee, Mrs. W. S. Johnston, Mrs. Lappin, Mrs. Dall, Miss Howe, Miss Stoddart, and Miss Barn.

NEW C.W.G. PLANT AT BURY ST. EDMUNDS

At the invitation of the Chairman, Mr. S. J. M. Sampson, and Directors of the Bury St. Edmunds Gas Company, an inspection was made recently by a gathering including the Mayor, Alderman G. L. Coats, and a number of gas engineers from East Anglia of a new carburetted water gas plant of a capacity of 250,000 cu.ft. per day of 500 C.V. gas. The plant was constructed by Messrs. Humphreys & Glasgow, Ltd. It embodies all the latest improvements in automatic operation.

In addition there is a spirally guided 50,000 cu.ft. relief holder constructed by Messrs. Firth Blakeley Sons & Co., Ltd., two sets of electrically driven Bryan Donkin exhausters, four purifiers of Messrs. Clapham's manufacture, and a Connersville meter. The whole plant is situated on a site adjoining the coal gas plant and is entirely under separate control from the coal gas stream; the two streams, coal gas and water gas, are mixed at the inlet of town gasholders.

A new test room is attached to the plant containing a recording calorimeter, Boys calorimeter, and gas analysis apparatus, the recording calorimeter chart being visible to the gas-maker.

The guests were welcomed on arrival by the Chairman of the Company and the Engineer and Manager, Mr. H. R. Thomas, who gave a description of the plant and figures showing the increase in output of gas and maximum daily outputs during recent years. At the conclusion of the inspection the guests were entertained at tea in the Board Room.

FOUR YEARS' DEVELOPMENTS AT PRESTON*

By A. K. COLLINGE, M.Inst.Gas E.

Engineer, Preston Gas Company

IN response to the President's request for a practical Paper, I propose to describe the developments carried out at Preston during the last four years and those now in progress, stating the main considerations which have been taken into account. The variety of the problems which confront gas engineers, particularly during wartime and the post-war era of shortages, must find few parallels in other industries; but circumstances similar to those arising at Preston have developed in many other gas undertakings, and it is hoped that the extensions described and results obtained will prove of interest and provoke discussion.

The construction of the Lostock Hall Works of the Preston Gas Company was completed in 1931 on a new site 34 acres in extent, three miles south of the town, and adjoining the L.M.S. Railway. The existing works, which occupied a restricted site without rail facilities near the centre of the town, was closed down and the plant ultimately dismantled. A photograph (Fig. 1) of the new works is reproduced to indicate the layout, in which full advantage was

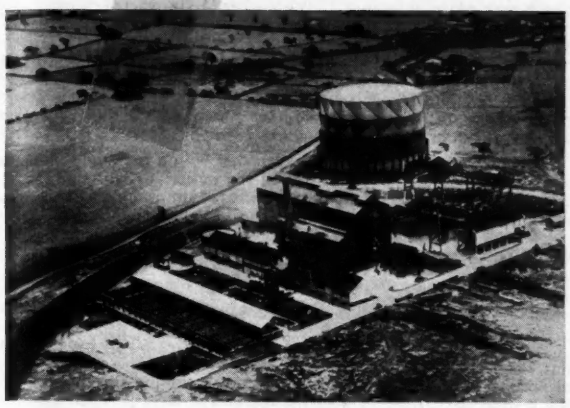

FIG. 1.—*The Lostock Hall Works of the Preston Gas Company*

taken of the contour of the land and close attention given to the possibility of future developments. The plant was designed in one compact unit divided from the undeveloped portion of the site by a roadway, and the wisdom of this plan has become increasingly apparent with the necessity to embark on major extensions. The capacity of the works was five million cu.ft. of gas per day, and the total cost, including land, three million cu.ft. gasholder and 30 in. trunk main to the town, was £300,000.

From 1931 until the outbreak of war the output of gas increased from 1,033 to 1,100 million cu.ft. per annum, and the plant was fully adequate to meet all demands with ample margins for contingencies. During this period the population in the Company's area remained stationary and a keen sales policy was developed to meet the intensive competition of the Corporation-owned electricity undertaking. In the decade ended 1939 the total value of appliances sold amounted to £354,000. The number of consumers was 45,500 at the end of the period, and a slight fall in consumption for domestic purposes was made good by the increased use of gas in industry.

From the outbreak of war in 1939, however, the output of gas increased rapidly, as was the case in many undertakings, and the following table indicates its extent:

	Annual output Mill cu.ft.	Maximum day Thous. cu.ft.	Average day of maximum week Thous. cu.ft.
1939	1,106	4,230	3,950
1940	1,164	4,856	4,262
1941	1,325	4,792	4,317
1942	1,387	5,010	4,601
1943	1,406	4,880	4,568
1944	1,518	5,526	5,029
1945	1,578	6,050	5,751
1946	1,696	6,295	5,679
Increase	1,590	2,065	1,729
% increase	53.6%	48.8%	43.8%

One-fifth of the increase during the war years was due to the rise in industrial gas consumption, mainly at a large aircraft factory, and there is every indication that the remaining increase is a permanent load.

The steps taken to meet the growing demand and also to make provision for the carrying out of adequate maintenance and repair are described as follows.

Carbonizing Plant

The carbonizing plant comprised 10 beds of Drakes vertical retorts arranged in two benches, one of six beds and one of four beds, with a continuous main flue alongside and a branch flue to the waste-heat boilers in an adjoining boilerhouse. Each bed consists of eight retorts with a throughput of 4.2 tons of coal per day when producing 450 B.Th.U. gas after benzole extraction. The coal is handled by a rotary tippler, twin bucket elevators, and a reversible drag-bar conveyor over the storage hoppers. The coke is discharged into skips and transported by telpher to the screens, to storage hoppers over each individual producer, or to stock.

By the spring of 1944 the maximum day's output had increased to five million cu.ft. and the maximum week to 32 million cu.ft. These figures still left an appreciable reserve for peak periods as the plant was capable of producing 40 million cu.ft. per week with every retort in operation, but periods available for repairs had become seriously restricted owing to the increase of the summer load and the compulsory use of Durham coals. The extent of the former is indicated by the following increases in consumption over 1939:

Maximum week	15½%
Year	27%
Months of May and June ..	39%

The effect of the carbonization of Durham coals on the throughput per retort was such that the average number of working retorts for the months of May and June had increased by no less than 58%.

The necessity to install additional plant was thus apparent, and in determining its extent an estimate was made of the annual capacity of the existing plant by graphing the consumption and superimposing the maximum production possible throughout the year, allowing for normal repair programmes. Consideration was given to carburetted water gas, but at the time for a variety of reasons it was decided to adhere to coal gas plant.

The approval of the Ministry of Fuel and Power was sought in July, 1944, to extend the retort house and install two settings of eight retorts each with a capacity of 1½ million cu.ft. per day. The scheme was completed in February, 1946, and the following are its principal features.

The settings were upwardly heated and each is divided into four sections which are separately controlled. Each setting is provided with a separate producer divided into two sections, enabling half the bed to be closed down if necessary. In order to provide for the continuous operation of the new settings for periods of three years as against the normal two years of the original beds the producer linings were increased in thickness to 13½ in.

The life of extractor and coke chambers is in the region of 15 years and these have now been provided with renewable internal lining plates. No material alteration was made to the design of the top ironwork or gas valves, which had proved very satisfactory on the original settings and are shown in Fig. 2.

The main flue was extended and can be isolated into three sections by dampers. While the life of a steel-cased main flue can be regarded as almost indefinite it is the writer's experience that at intervals of about 10 years it is necessary to arrange for internal access to clear the connecting flues of broken dampers, flue dust, &c., and also to point them from the inside to reduce air infiltration. In order to make it possible to effect repairs to the middle section of the flue some years hence a branch has been provided on the new section which can be connected to an additional chimney or waste-heat boiler.

The coal is conveyed to the storage bunkers over the new settings by a 24-in. band conveyor fed from the end of the original drag bar conveyor.

An additional 30 cwt. goods or passenger lift was included in the extensions. This was erected on the side of the retort house adjacent to No. 1 coal stock and was provided with an outside gate in order that coal could be elevated by portable conveyors and jubilee wagons in the event of a serious breakdown. It is possible to utilize the original lift also for the same purpose.

The telpher track was extended through the new section of the retort house and thence to the end of the original track beyond the

* Paper at the Autumn Meeting of the Manchester District Association of Gas Engineers, Oct. 31.

screening plant making a complete circuit. Owing to the increase in gas output it was becoming almost impossible to repair the track or overhead wires, and this extension has enabled sections to be isolated

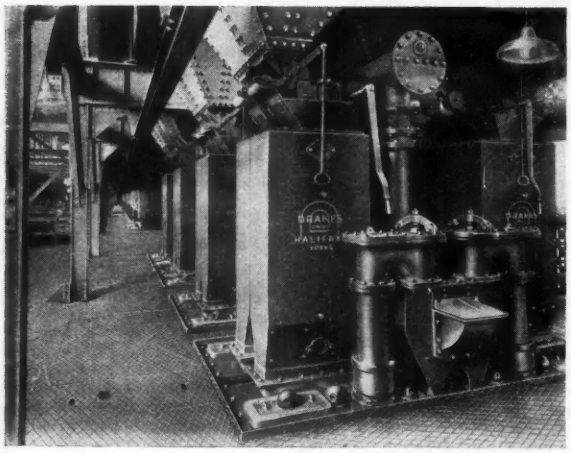

FIG. 2.—*View of the Charging Platform—12 beds of eight retorts*

and repaired without any interference with coke handling. The overhead wiring outside the retort house has in fact been renewed this year after a life of 16 years. A telpher repair house was also constructed as an extension to one corner of the retort house to facilitate repairs, and a third telpher was obtained in order to ensure a spare machine being available when the load necessitated two telphers being in operation together. Beneath the telpher house and on the same level as the charging stage a small mess room and shower bath was constructed for the use of retort house men.

The foul main was extended to the new settings and two Bryan-Donkin governors were installed, with a new main to the primary condensers. The foul main is now valved in three sections, but it has been found that these governors will operate quite successfully on each end of the main with all valves open without " hunting."

These extensions were carried out by Messrs. Drakes, Ltd., during a period of considerable stress and were completed in 14 months from commencing the foundations. They have proved fully satisfactory from every aspect, and the decisions made in 1944 have been amply justified.

Condensers

The original condensing system was designed to provide fractional condensation, the primary liquor being cooled and supplied to the washers in order to avoid the use of water and maintain a high crude liquor strength. The plant consisted of a battery of horizontal atmospheric condensers designed to cool the gas to 90° F. and water cooled secondary condensers following the exhausters to effect final cooling to 60° F. This scheme had operated admirably, but by the summer of 1945 the average daily make in the month of July had risen by 53% and the wet purification plant was operating inefficiently owing to high gas temperatures. It was therefore decided to install a water cooled condenser between the atmospheric condensers and exhausters, and this was completed the following summer. The plant was constructed by the Whessoe Foundry and Engineering Company, Ltd., and was designed to cool 250,000 cu.ft. of gas per hour from 120° F. (saturated) to 80° F. The cooling water is circulated from the tank of the three million cu.ft. gasholder by centrifugal pumps driven by Sissons high speed steam engines, and automatic regulators were fitted to control the engine speed in order to maintain the outlet gas at a pre-determined temperature. The rise in temperature of the gasholder water during periods of warm weather has not proved excessive, and the circulation is of distinct advantage during very cold spells in preventing ice formation in the tank.

Exhausters

The exhausting plant consisted of three Bryan-Donkin exhausters two of 125,000 cu.ft. per hour capacity, new in 1931, and the third of 150,000 cu.ft. per hour which had been transferred from the old works. During the winter of 1945-46 it was necessary to operate the three machines together, and it became apparent that major repairs would shortly become necessary to the largest exhauster. A fourth exhauster of the same capacity still remained at the old works, having been retained for A.R.P. purposes, and in 1946 this was transferred, the exhauster house being enlarged to accommodate it. There is thus ample capacity for the maximum make of coal gas and also for the carburetted water gas plants which are now being installed.

Electrostatic Detarrer

In 1943 an electrostatic detarrer was installed in a position preceding the Livesey washers. This was carried out in accordance with modern practice in order to improve the efficiency of the washing plant and purifiers. The advantages of such an installation are widely recognized and have been experienced to the full, but two difficulties ensued which it was necessary to overcome. The first was the formation of tar emulsion, which was easily disposed of by circulation through the hydraulic mains, and the second was leakage of purifier valves owing to the absence of a protective tar film on the faces, to which reference will be made later.

The detarrer was installed by the Whessoe Foundry & Engineering Company, Ltd., and its rated capacity is five million cu.ft. per day. In the light of the subsequent extension of the coal gas plant, which was not then visualized, a larger plant would be an advantage; but the existing unit has passed 6¼ million cu.ft. per day without any measurable drop in efficiency and little increase in back pressure, and has been virtually trouble free since its installation.

Static Ammonia Washer

The washing plant installed in 1931 was in duplicate, each section consisting of two Livesey washers and a Holmes rotary brush washer. Both Holmes washers were of an early type, having been acquired secondhand, and in 1943 the older of the two was replaced by a modern static washer. This also was installed by the Whessoe Foundry and Engineering Company, Ltd., and has several features which may prove of interest. The washer is constructed of meehanite cast iron and is divided into six chambers packed with wooden grids. Special means were adopted for preventing the carry-forward of spray from one chamber to the next, upon which the efficiency of a multi-stage washer so largely depends. The liquor is circulated through the compartments by a set of six centrifugal pumps driven by a Sisson steam engine geared by " Fabroil " pinions and thus leakage of liquor between the pumps is impossible.

The efficiency of the washer is such that with a reasonably low gas temperature the ammonia content of the outlet gas is maintained at 5 grains per 100 cu.ft. by the use of primary liquor alone as a washing medium. The average strength of the well liquor is 2%, which is considered very satisfactory for a vertical retort plant producing 450 B.Th.U. gas, minimizing, as it does, the steam costs of liquor distillation.

Purifiers

The purification plant consisted of four boxes 60 ft. by 40 ft. by 6 ft. deep and a catch box 40 ft. by 30 ft. by 6 ft. These were erected at ground level, advantage being taken of a sloping site to construct the revivifying floor level with the top of the boxes. Their capacity is 220 tons of new oxide each (110 tons in the catch box) and they are rated to purify a maximum of five million cu.ft. of gas per day. Over a period of 10 years this figure was rarely exceeded, but in the winter of 1944-45 the average day's make during the maximum week was 5¾ million cu.ft. Although there was also a considerable increase in the H_2S content of the crude gas, due to inferior coals, the plant stood up to this load successfully, but preparations had been made by ensuring good quality oxide in every box and the advantage of the detarrer was evident. In view of the probability of further increases in output it was decided to install additional plant, and application was made to the Ministry of Fuel and Power in August, 1945, the new plant being completed by February, 1947.

The installation, which was carried out by Messrs. R. & J. Dempster, Ltd., comprises four boxes, each 40 ft. square by 6 ft. deep, with the plates at one end prepared for the addition of a further box in the future. The connexions to the original set were planned so that the outlet gas could be passed through the catch box if necessary. The main features of the installation are as follows:

(*a*) *Site*. The boxes were erected at ground level similar to the existing set, with revivifying floor alongside. Consideration was given to overhead purifiers, but the estimated annual net saving in oxide handling costs did not justify the large additional capital expenditure, particularly since ample ground space was available. In emptying and filling all the purifiers full use is made of pneumatic tools, portable belt elevators, motor vehicles, and mechanical loading shovels.

(*b*) *Design*. The purifiers are constructed of cast iron plates with internal flanges and vertical stiffening ribs on the side plates. The covers are built up of ¼-in. riveted M.S. plates and are secured by ring tightening screws and clamps. After experience of various types of so-called quick fasteners the older and simpler method was adopted. The jointing material is plaited graphited asbestos, which has proved very satisfactory over a long period and is now in general use.

(*c*) *Lagging*. As the result of considerable investigation on the existing purifiers it was concluded that indirect heating by steam coils was not satisfactory in the case of exposed purifiers. It was considered more desirable to retain the heat produced by the chemical reactions than add considerable heat by steam, which is rapidly dissipated from the exposed surfaces. The covers were therefore lagged on the

inside with hair felt and 1-in. T. and G. boards, and this has proved very satisfactory, preventing overheating during hot weather and maintaining adequate temperatures in the winter with the addition of a little live steam to the gas stream.

Similar lagging was adopted on the new purifiers, using slag wool in place of hair felt, and the timber was treated with creosote and tar in order to prolong its life. The cost was £857, or 3s. 9d. per sq. ft., as compared with 1s. 3d. per sq. ft. for the first installation.

(*d*) *Valves.* The valves on the original purifiers were fitted with renewable discs but, as already stated, the installation of the detarrer was followed by difficulties with leakage. It was found that under conditions of tar free gas graphitic corrosion was taking place on the valve seats. It was not practicable to grind them in *in situ*, and the installation of the new plant has made it possible to remove the valves bodily and reface the seats. In the light of this experience it was specified that the valves on the new purifiers were to be designed with seats and discs both renewable, together with rotating gear.

(*e*) *Control.* In order to effect control of the amount of gas passing through each set an inferential meter with integrator has been installed on the inlet to the new plant. This is considered to be a most desirable feature for economical operation, particularly in view of the small cost involved.

Steam and Power Plant

The boiler house is situated alongside the retort house, being separated by a party wall. This arrangement isolates the plant from dust and smoke and at the same time avoids the necessity for a long main flue with consequent increased heat losses.

The plant comprises three Spencer-Bonecourt waste heat boilers on a stage floor and two Lancashire boilers on the ground floor, the dimensions being as follows:

No. 1 waste heat boiler, 9 ft. diameter by 20 ft. long.
No. 2 waste heat boiler, 8 ft. diameter by 22 ft. long.
No. 3 waste heat boiler, 8 ft. diameter by 22 ft. long.
No. 4 Lancashire boiler, 9 ft. diameter by 30 ft. long.
No. 5 Lancashire boiler, 9 ft. diameter by 30 ft. long.

These boilers, which operate at 150 lb. pressure, have been fully adequate for all the steam requirements of the works, two waste heat boilers and one Lancashire boiler providing an ample supply of steam at all times. The average inlet temperature of the waste gases is 800° C. with an outlet of 230° C., and the feedwater is heated to a temperature of 170° F. by exhaust steam.

The works is entirely self-supporting for power requirements, all of which are steam generated, and the economy of operation is indicated by the fact that the average annual consumption of solid fuel over the past five years has been 360 tons of coke and 280 tons of breeze. The Lancashire boiler is only actually "steaming" for very short periods each day, the load variation being met by adjustment of the main chimney damper and the speed of the waste heat boiler fans. It should be mentioned that there is no augmentation producer, but careful attention is always given to the reduction of air infiltration.

The power plant consists of three 125 kW. D.C. generators driven by vertical compound steam engines running at 500 r.p.m. The exhaust steam is utilized for heating the boiler feed water, water for washing purposes, and radiators in the workshop, offices, and laboratory. The plant throughout the works which is electrically operated is in accordance with usual gas-works practice and includes the waste heat boiler fans.

The large increase in both base and peak loads on the boilers and generators due to the increased gas output has been investigated and the following modifications are being carried out:

(*a*) *Boilers.* While the boiler capacity is still sufficient to meet all requirements, the periods available for cleaning and repairs have been considerably reduced. The waste heat boilers have been re-tubed once since the plant was put to work, and in view of future re-tubing it is considered desirable to increase the steaming capacity of the Lancashire boilers and effect further economies in the use of steam generally. In addition, although the C.W.G. plants to be installed will be self-supporting in steam there will be a considerable demand during starting-up periods.

The capacity of these boilers is therefore being increased by the replacement of steam injectors by fan forced draught and the fitting of new grates, which is being carried out by the Chemical Engineering & Wilton's Patent Furnace Company, Ltd.

(*b*) *Waste Heat Boiler Fans.* The fans on the waste heat boilers are driven by a 40 h.p. motor on No. 1 boiler and 30 h.p. motors on Nos. 2 and 3. These have operated very successfully during their 16 years of working life, although there have been very occasional short period difficulties due to electrical faults such as short circuiting in a field coil.

Major repairs or renewals would probably be necessary within a few years, and in view of all the circumstances the motors on Nos. 1 and 2 boilers are to be replaced with back pressure turbines, the outlet steam at 20 lb. pressure being passed to the retorts. This will result in steam economy and at the same time will enable the increasing electrical load on other sections of the works to be carried by one generator in operation, with a stand-by always available.

(*c*) *New Booster.* A new booster which is being installed to supply the district will be driven by a 100 h.p. back pressure turbine, also discharging into the L.P. steam system. Since this will replace two smaller boosters from which the steam is discharged to atmosphere further steam economies will be effected.

Operating Results

The average operating results of the plant over the past seven years are summarized as follows:

Therms per ton of coal carbonized (including benzole)	79.3	
Average calorific value	450.9	B.Th.U.
Coke and breeze sold per ton of coal carbonized	10.6	cwt.
Fuel Expenditure Index	18.5	

The average receipts for gas during this period are as follows:

	d. per therm
1939	7.86
1940	8.52
1941	8.44
1942	8.58
1943	8.58
1944	8.62
1945	9.66
1946	9.84
Increase	1.98 = 25%

I would conclude this portion of my Paper with a few remarks on the internal quenching of coke, which I believe to be of general interest. A system was introduced at Preston in 1935 whereby the coke in the extractor chambers is sprayed intermittently by means of mechanism operated from the main extractor drive, and I believe similar systems are now fairly general. By this means the coke is thoroughly quenched and its moisture content before screening does not exceed 1%. A drawback to this scheme, however, is the effect on the life of the bottom castings; but against this are many advantages, not the least of which is the saving in live steam requirements. Tests have shown that the amount of steam produced by the spraying of the coke is equal to 4½% of the weight of coal carbonized, or an average of 1,150 lb. per hour, and the resultant saving in solid fuel amounts to 750 tons per annum.

It would, of course, be desirable if the water spray could be continuous, but the small size of the jets required would cause continual blockages. An attempt has been made on the two new settings to overcome this defect by a steam jet designed to act as a water injector. The system is operating successfully but the jets require frequent attention and are less positive in action than the intermittent type. The effect on the bottom castings will possibly be reduced, but this can only be determined in the course of time.

Further Plant Extensions now under Construction

Shortly after the completion of the extensions to the carbonizing plant in February, 1946, it became apparent that the continuing demand would quickly absorb the increased production capacity if full allowance were made for re-setting programmes. In considering the extent of further additions an estimate was made of the potential industrial load and regard was paid to the following factors which would influence the domestic load:

(1) The Government had accepted the main conclusions of the Fuel and Power Advisory Council (Simon Report) which recommended as the basis of a national fuel policy good standards of heating in the home with low cost and increased convenience, the most efficient use of fuel, and the abolition of smoke.

(2) The price of domestic coal had increased by 80% since 1939 and the price of gas by 25%. The cost of coal per useful therm in an open fire and the corresponding cost of gas consumed in gas fires were approximately the same, and if the gas were consumed in convector fires, or in radiators with 100% efficiency, the cost per useful therm was very considerably less.

(3) The scarcity and increased cost of domestic service was creating a large demand for all labour saving appliances.

(4) Various housing schemes were to be developed within the Company's area of supply during the next few years.

In view of the pressure exerted by the Ministry of Fuel and Power for increased water gas production and the time required to construct new carbonizing plant, the selection of the type of plant to be installed presented no alternative. The advantage to be derived from the flexibility of water gas plants was also becoming of increasing importance in view of the greatly reduced holder capacity measured in hours' supply, and also the effect of varying coal qualities, which was causing the make of gas per retort to fluctuate up to 8% within 24 hours.

In arriving at the size of plant required the annual capacity of the existing plant was determined graphically, allowance being made for

epairs, and was established to be 1,750 million cu.ft. (the daily capacity being 6¼ million cu.ft.). An analysis of the consumption throughout the year and the nature of the anticipated increases made it apparent that the additional plant would be required to meet a base load within a comparatively short period; and it was therefore decided to install duplicate plants, the capacity of each to be 1¾ million cu.ft. per day nominal, 1.6 million cu.ft. actual.

The effects of varying proportions of water gas upon distribution and utilization were given close attention, since consumers had been accustomed to straight vertical retort gas for 15 years with negligible variations in calorific value and specific gravity; and certain industries in the town are very stringent in their requirements for precise and regular flame lengths, particularly manufacturers of electric lamps. This subject was dealt with most adequately in a Paper presented to the Southern Association of Gas Engineers and Managers in 1938 by Stredwick and Thorne, which indicated that the A.T.B. numbers of coal gas and water gas coincide at a calorific value of 445 B.Th.U. They differ widely at 480 B.Th.U., which was the declared value of Preston gas until 1931, when water gas was last produced, and complaints were very frequent. With a declared calorific value of 450 B.Th.U. no difficulties are anticipated since distribution pressures will be adjusted to meet variations in specific gravity.

The effect of the average net cost of materials for gas into holder was calculated on the basis of maximum coal gas production of 1,750 million cu.ft. per annum and an additional 250 million cu.ft. of water gas. This proved to be an increase of 0.3d. per therm without taking into account the oil subsidy, which will be offset to a certain extent by improved efficiency of the coal gas plant due to the flexibility of water gas production and by saving in labour and maintenance costs.

The serious effect upon the coke market of the large increase in C.W.G. production throughout the country in recent years is likely to be still more pronounced in the winter of 1948-49, when the many plants now being constructed will be in use. Each 100 million cu.ft. of water gas produced requires 1,600 tons of coke, and if this replaces coal gas for any reason, such as plant repairs or coal shortage, the coke available for sale is reduced by 4,200 tons. There appears to be little remedy for this situation apart from the maximum possible use of the coal gas plant available, assuming, of course, adequate supplies of coal.

The two plants to be installed are to be supplied by Messrs. Humphreys & Glasgow, Ltd., and will be completely automatic, with mechanical ash extraction, cyclic coke feeds, and waste heat boilers. The coke is to be elevated by a travelling skip hoist, and the layout of the plants is such that a third unit can be added in the future if required. The air blowers are turbine driven and housed in a separate room, and the exhaust steam will be utilized for preheating the boiler feedwater. The machinery room, which houses the various pumps and a Connersville meter, with provision made for exhausters, is to be air conditioned.

A welded steel oil storage tank of 100,000 gall. capacity has been installed by the Oxley Engineering Company, Ltd., and a riveted two lift relief holder of 250,000 cu.ft. capacity is in course of erection by Messrs. Ashmore, Benson, Pease & Co., Ltd.

Initially the water gas will be mixed with the coal gas at the inlet to exhausters, the volume being controlled by a Bryan-Donkin governor to compensate for variations in holder pressure, but the connexions have been designed for the future installation of separate exhausters with a detarrer to follow.

The electric power requirements of the plants are very small apart from the skip hoist motor and will be supplied from the works generators; and the plant will be virtually self-supporting in steam.

In view of the extent of constructional work involved on a virgin site, and the present delays in obtaining materials, it is not anticipated that the first of the plants will be completed before the summer of next year.

Schedule of Costs, including Site Preparation, Foundations, Connexions, Valves, and Services

Item	Description	Cost £
Carbonizing Plant		
	Two settings of eight Drakes vertical retorts, capacity 1¼ million cu.ft. per day. Extension of retort house and telpher track. Construction of masonry retaining wall longside railway sidings	68,734
Telpher House and Mess Room		
	One telpher repair house, with mess room and shower bath beneath	1,628
Condenser		
	One six-pass water cooled condenser with vertical tubes, capacity six million cu.ft. per day. Pumping equipment and pipeline to gasholder tank	3,795
Exhauster		
	Extension of exhauster house and transference of 150,000 cu.ft. per hour exhauster from old works	1,224
Detarrer		
	One electrostatic detarrer, capacity five million cu.ft. per day	2,293
Ammonia Washer		
	One cast iron static ammonia washer, six-pass, capacity five million cu.ft. per day	1,895
Purifiers		
	Four boxes 40 ft. by 40 ft. by 6 ft. deep, complete with revivifying floor and roof	39,428
Meter		
	One inferential meter with integrator	117
Boilers		
	Replacement of steam injectors by motor driven fans on two Lancashire boilers	917
	Replacement of two electric motors driving waste heat boiler fans by steam turbines	982
Boosters		
	One turbo booster of 300,000 cu.ft. per hour capacity with 75 in. pressure rise, driven by a 100 h.p. back pressure steam turbine	3,034
	One turbo-booster of 600,000 cu.ft. per hour capacity with 20 in. pressure rise, driven by Meadows six cylinder petrol or gas engine, and extensions to govenor house	4,032
Water Gas Plants		
	Two complete fully automatic Humphreys & Glasgow carburetted water gas plants with W. H. boiler, self-clinkering grates, condensers, and coke skip hoist. Capacity of each set 1.6 million cu.ft. per day actual. Steel framed brick house with mess room and stores. 100,000 gall. oil storage tank and 250,000 cu.ft. relief gasholder (estimated)	100,000
		£228,079

Increase in works capacity	
Coal gas	1.25 million cu.ft. per day
Carburetted water gas	3.20 million cu.ft. per day
Total	4.45 million cu.ft. per day

Distribution System

Following upon the completion of the new Lostock Hall Works in 1931 the distribution system was developed from two trunk mains into the town, of 30 in. and 18 in. diameter, both of which cross the River Ribble as shown on the accompanying diagram (Fig. 3).

The 30 in. main is connected to the town's arterial mains system at eight points, pressures being controlled by a station governor and a gas engine driven booster to which has been added an alternative electric motor drive.

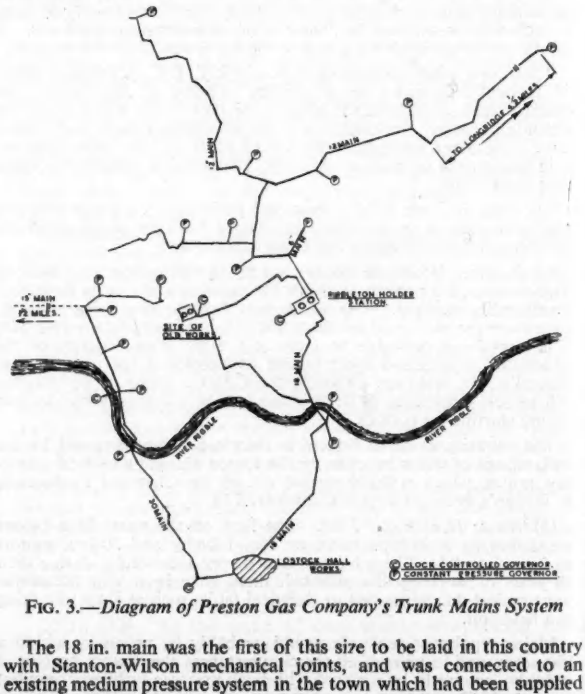

FIG. 3.—*Diagram of Preston Gas Company's Trunk Mains System*

The 18 in. main was the first of this size to be laid in this country with Stanton-Wilson mechanical joints, and was connected to an existing medium pressure system in the town which had been supplied from the former works. It is fed by two turbine driven boosters and supplies the town mains at seven points through governors,

two one million cu.ft. gasholders at Ribbleton storage station, two smaller holders at the old works, and also the village of Longridge, which is nine miles from the works.

The total length of mains in the Company's statutory area of 50 square miles is 350 miles, throughout which a constant survey of pressures is maintained by recording gauges at various points.

The increasing load on the distribution system was met by raising pressures, and it has been fortunate that the peak load has not increased in the same proportion as the total output. The principal factor in considering distribution pressures is, of course, the maximum rate of consumption over a short period of the order of five minutes, which at Preston is 1½ times the average rate for the maximum hour. In order to ensure adequate supplies throughout the district at these peak periods without carrying excessive pressures in certain areas the follow ing measures have been taken:

(1) One of the two holders at the old works was extensively repaired by welding by the Oxley Engineering Company, Ltd., and an electrically driven booster and clock controlled governor were installed.

(2) Night filling of the Ribbleton holders was instituted to maintain increased trunk main pressures during the daytime. This was effected automatically by a device which was designed to operate in conjunction with a Peebles clock controlled governor installed on the holder inlet, the cam which controls the pilot valve being designed to restrict the holder filling operation to selected night hours. The governor is weighted to prevent the pressure in the trunk main falling below a predetermined minimum and is automatically closed when the holder is full. An electric warning device is fitted in the attendant's house to sound in the event of the governor failing to close, but the installation has operated faultlessly for a period of 18 months, during which the most severe weather conditions have been experienced.

(3) Two water loaded station governors at Ribbleton have been replaced by larger clock controlled governors.

(4) Five additional constant pressure governors are being installed connecting the 18 in. trunk main to the town mains.

(5) 850 yards of 6 in. main have been laid from the 18 in. main to an area deficient in pressure, terminating in a governor.

(6) A new booster is being installed at the works of 300,000 cu.ft. per hour capacity with a 75 in. pressure rise. This is driven by a 100 h.p. back pressure steam turbine.

(7) Two clock controlled and six constant pressure governors are now being installed connecting the 30 in. main to the town mains.

(8) To increase pressures in this main a turbo booster has been installed at the works of 600,000 cu.ft. per hour capacity with a pressure rise of 20 in. Since this is sited a considerable distance from the steam plant it is driven by a Meadows six cylinder petrol or gas engine. The transmission is by fluid flywheel and V belts.

(9) One and a half miles of 15 in. main are to be laid within the next 12 months from the 30 in. trunk main to augment the supply of an area to the west of the town where extensive housing schemes are to be developed.

It is anticipated that these measures will prove adequate to meet the load for some years, but further schemes are under consideration involving the reconstruction and enlarging of the two holders at Ribbleton, the installation of district high pressure holders, and further increases in booster capacity.

The Future

Since the year 1941 when coal was fairly plentiful the average annual consumption per prepayment consumer has risen by 51% from 17,600 cu.ft. to 26,560 cu.ft., an increase which is due in no small measure to the growing scarcity of solid fuel. The degree of this shortage is indicated by the fact that since that year the amount of coal delivered annually for domestic purposes in Preston has been reduced from 240,000 tons, or five tons per house, to 125,000 tons. It is of interest to observe that the increase in domestic gas consumption during the same period is 1¾ million therms per annum, which performs the same duty as about 20,000 tons of coal, and the increase in the amount of coke supplied to the town is 10,000 tons. It is evident, therefore, that a large gap of heat requirements remains to be filled to restore pre-war conditions, even after making generous allowances for the increased consumption of other sources of heat.

The coal shortage, coupled with its soaring price, may be said to be one of the most influential factors which has ever affected the progress of the Gas Industry. It has focussed the attention of the Government and the public on the Gas Industry's oft-repeated claims over the past 25 years that the country's coal resources should be used in the most efficient manner possible. The Parliamentary and Scientific Committee, which includes 200 Members and representatives of 70 scientific institutions, has recently declared that the lack of two million tons of coal last winter cost the country £200 million in exports, and that if the present efficiency of coal utilization could be increased by one-tenth our fuel problems would be solved. The Gas Industry can and must take a full share in the solution of this problem, the seriousness of which is even now not fully realized by the public.

An additional factor of importance influencing the demand for gas is the purchasing power of the community. Currency circulation has increased by 8% (£100 million) since 1945 and is still rising. The aggregate purchasing power of the country still vastly exceeds the available consumer goods, and with the large reduction of imports, the absence of a national wages policy, and increased earnings due to the restoration of working hours at overtime rates, the relationship is likely to go still further awry. The only restraining influences would appear to be further increases in the cost of living, which appear to be inevitable, the possibility of large scale unemployment, or positive measures by the Government to check this inflationary tendency. At the present time, however, the public are willing to spend their surplus money on the limited degree of comfort and convenience which can be obtained in the home, particularly in view of real and increasing hardship due to food and clothing shortages; appeals for economy are of little avail, and the difficulties of enforcing general restrictions in gas consumption are fully apparent.

If the new proposed coal target of four million tons per week is achieved, which is open to doubt, coal for domestic purposes will still be in short supply; and the fact that stocks now held by gas undertakings are higher than for some years is sufficient indication that the Government regard the maintenance of gas supplies as of primary importance. Although further increases in gas charges are inevitable owing to the increase in coal costs and railway rates, the cost to the consumer will still prove attractive as compared with other fuels.

These considerations afford sufficient grounds for the general anticipation of extensive developments which is evidenced by the many large plant installations projected—an anticipation which is only clouded by the difficulties of obtaining plant in sufficient time. It is hoped that these will be overcome to some extent by the Government's decision to re-impose in a modified degree the wartime control of labour. The Industry can play as vital a role in the national crisis as it performed during the war period, and if effect is given to the recommendations made in the Simon Report it would appear that developments of an order far exceeding the predictions of the Heyworth Committee lie ahead.

In attempting to translate national tendencies to local possibilities I have in mind that there are still 125,000 tons of domestic coal consumed annually in Preston, a considerable proportion of which can be replaced by gas and coke at no additional cost to the consumer, and a large heat deficiency to be made good; that there is a pronounced preference for gas appliances in new housing estates; that large industrial loads await development when materials become available; and, lastly, that the foresight exhibited 22 years ago by my Board of Directors makes possible further plant additions on the same site to increase the total works capacity to 17-20 million cu.ft. per day.

SCIENTIFIC AND TECHNICAL RESEARCH

Following are some conclusions drawn from the statistical survey carried out by the F.B.I. Industrial Research Secretariat to assess the scientific and technical research effort in British industry's laboratories and works. The survey is based on returns from 420 firms (each spending not less than £1,000 a years on research) covering, it is estimated, some 75% of British industry's total research effort. The survey is published by the Federation, 21, Tothill Street, S.W.1, price 1s.

British industry is now spending about £30,000,000 a year on industrial scientific research. This research is carried out by a staff of some 45,000, of whom about 10,000 are qualified scientists and engineers. More than half the 420 firms are in direct contact with universities and technical colleges and 60 have endowed research scholarships or fellowships.

Three firms out of every five doing research plan to expand their scientific facilities for which they require new laboratory buildings of more than 3,000,000 sq. ft. of floor space and additional qualified staff of the order of 2,500. The chief demand is for (*a*) chemists, (*b*) engineers, and (*c*) physicists. Delay in delivery of scientific and testing instruments and equipment is impeding research progress.

During the period January, 1946, to December, 1947, British industry planned to increase its research staff by 25%. This, however, has been largely frustrated owing to the prevailing shortage of scientific manpower, the effect of which has been intensified by the calling up to the services of substantial numbers of scientists and engineers graduating from the universities.

The more than ten-fold increase in the expenditure by industry on research during the last 15 years shows how dependent industrial progress has become on scientific work and its application, and demonstrates the necessity, under the present more difficult conditions, of the need for the rapid expansion of scientific facilities within industry in the interest of increasing industrial production and export trade. It is encouraging that three firms out of every five doing research plan an expansion of their research activities.

For comparison purposes present annual Government expenditure

on, or in aid of, industrial research is £4,500,000, making a total expenditure for industrial research of £35,000,000. Government expenditure on defence research is £60,000,000.

Recent evidence shows that building licences for about half the number of new laboratory expansions planned have been granted, but shortage of materials and manpower are delaying completion. Although the Committee recognize that serious capital cuts are necessary, the total cost and effort involved in the construction of the new research laboratories planned represent only a very small fraction of the total building programme. These laboratories are essential for the future industrial and economic life of the country and the return to the nation should be out of all proportion to the building effort involved. The Committee urge, therefore, that research laboratory schemes, which would strengthen the country's economic position, should be given high priority.

COMPANY MEETING

GEORGE WILSON GAS METERS, LTD.

The 11th Ordinary General Meeting of George Wilson Gas Meters, Ltd., was held on Oct. 28, at the Mill House Hotel, Baginton, near Coventry, Mr. W. D. WILSON, B.E.M. (Chairman and Managing Director), presiding.

The CHAIRMAN said: The Directors' report and statement of accounts for the year ended Mar. 31, 1947, have now been in your hands for some little while, and I am assuming that you will be agreeable to taking these as read, as has been the custom in the past. I hope that you will feel, with me, that the past year has proved reasonably satisfactory despite the many difficulties with which we have had to contend, such as the fuel crisis, the results of which are, however, more likely to be reflected in the current year's accounts.

Last year I was, perhaps, viewing the situation in a somewhat pessimistic manner, but despite the fact that the Company's trading profit has risen from roughly £29,000 to £40,000, I feel that the events of the past year have proved that my warnings were substantially correct. This may appear to be something of a contradiction, but it cannot be sufficiently emphasized that a large part of the successful trading in the year under review resulted from the clearance and termination of certain war contracts which continued into the early part of the financial year. Your Company is now wholly engaged upon the manufacture of gas meters and other appliances connected with the Gas Industry, and the whole of the output is now the subject of competition and production difficulties associated with civil trading as opposed to war contracts.

I think it is only right that I should make reference to certain important matters which affect the financial prospects of the Company for the current year. We have recently transferred a large section of our manufacturing organization from Coventry to the north-eastern industrial development area and the expenses incurred in this transfer have been very considerable, partially due to the fact that the premises to which we were moving had not been completed as originally promised. Similarly, trading conditions are, to put it mildly, probably more complicated than ever industry in general, or this firm in particular, has had to contend with in previous years. Future prospects will depend almost entirely upon the supply of fuel and raw materials coupled with the policy of H.M. Government in relation to the gas meter industry and its degree of priority in the national industrial programme.

I presume that we shall be required, very naturally, to take our part in the export drive, but in this connexion we are very largely dependent on negotiations by the Government for international trade agreements. Without their success we cannot hope to make any major contribution, as we have already experienced instances of countries requiring gas meters but being unable to obtain the necessary import licences. Similarly, it is part of the Government's responsibility to ensure that any list of priorities which they feel disposed to introduce must not relate solely to the final product, but must take into account the subsidiary components which are necessary to the completion of such product.

We have during the current year suffered severely on occasions from raw material shortages, and I see no likelihood of any improvement. Furthermore, prospects for the coming winter in relation to supplies of fuel are most disturbing, and in all these circumstances I feel it is wise to maintain a cautious outlook. However, your Company has achieved considerable progress and expansion and has extended its activities in new directions through its investments, in association with other organizations, in subsidiary companies. It is hoped that such development of the Company's business will tend to alleviate the difficulties which lie before us.

Your Board is recommending that the Ordinary dividend for the past year should be at the rate of 15%, a rate considered to be in accordance with the conservative dividend policy which has always been adopted.

The report and accounts were adopted and a dividend of 15%, less income tax, on the Ordinary shares was declared. The retiring Director, Mr. Wilfred A. Dobson, Assoc.M.Inst.Gas E., was re-elected; and the Auditors, Messrs. Daffern & Co., were re-appointed.

When the Coventry Branch of the Women's Gas Council visited the works of the Parkinson Stove Co., Ltd., at Stechford recently, the party, numbering 85, were photographed at tea. Left to right at the top table were: Mr. W. J. Steed, Publicity Officer, City of Coventry Gas Department; Mr. J. Anstey, Parkinson Stove Company; Mrs. J. E. Wakeford, Chairman, Coventry Branch; Mr. R. J. Rogers, Deputy Chairman, Parkinson Stove Company; Mrs. G. Briggs, Mayoress of Coventry; Miss I. Chalmers, City of Coventry Gas Department; Mr. J. Broad, Parkinson Stove Company; Mr. J. Hurdman, Parkinson Stove Company.

ASHTON CAN MAKE IT

Ashton-under-Lyne celebrated its Centenary on Sept. 27 with a Black Knight Procession and the opening of the Ashton Can Make It Exhibition by Mr. L. J. Edwards, O.B.E., M.P., Parliamentary Secretary of the Ministry of Health. It is estimated that 20,000 people paid for admission.

The photograph above shows (left to right) Alderman J. Hadfield, J.P., Mr. L. J. Edwards, O.B.E., M.P., Parliamentary Secretary to the Ministry of Health, the Mayoress and the Mayor, Alderman J. R. Howard, J.P., examining a proto-type model of the "Ajax" neat gas cooker made by Sidney Flavel & Co., Ltd. Below is the Gas Company's mobile compressor unit, which won second prize in Class 11 in the procession. This vehicle, which attracted considerable attention from the crowd, is an ex-W.D. Chevrolet with an Ingersoll Rand compressor unit mounted in the rear.

GAS STOCKS AND SHARES

The past week has been a quiet and somewhat apprehensive one, due principally to Sir Stafford Cripps' announcement of further drastic steps to meet the situation which has overshadowed most dealings. On Monday the mining sections were sagging badly but rallied slightly by the next day; news of the troubles in South Wales was largely to blame. The start of the new Account on Wednesday brought some firmness to the market but there was no material increase in industrials and the majority of changes were adverse to holders. The threat to our production programme by uncertain coal supplies and the uncertainty of the interim Budget were further factors in a dull and pessimistic week. The *Financial Times* Industrial Index fell gently to 111.6 on Thursday, a difference of only 1.3 on the previous week's figure; the Government Index, on the other hand, rose slowly to 114.47.

Transactions in gas shares were rather more in number than the past few weeks; the rises and falls were as follows:

OFFICIAL LIST

Associated Gas & Water Udtgs. deferred	19/-	— 21/-	+ 6d.
Do. 4 p.c. irred. cum. pref.	18/6	— 20/6	— 6d.
Brighton & C., 5 p.c. std. cons.	95	—'00	— 1
Do. 6 p.c. std. cons.	07	—112	— 1
Cardiff, cons. ord.	13	—118	— 3
Commercial, ord.	79	— 84	— 1
Croydon, 4 p.c. perp. deb.	97	—102	+ 2
Gas Light & Coke, ord.	19/6	— 20/6	— 9d.
Imperial Continental, cap.	107	—112	+ 3
Newcastle & Gateshead 3½ p.c. perp. deb.	90	— 95	+ 5
South Eastern Gas Ltd., ord.	20/	— 22/	+ 6d.
South Metropolitan, ord.	88	— 91	— 1
Wolverhampton, cons. ord	120	—125	— 2

Quotations on the London Stock Exchange

When ex-Dividend	Dividends Interest.% Last Yr.	Prev. Yr.	NAME.	Quotations Oct. 30
Sept. 3	—	4	Alliance & Dublin Cons. Ord.	20/6—22/6
Oct. 29	—	5	Asscd. Gas & Water U'd'tgs Ord.	18/6—20/6xd
,,	—	6	Do. Deferred	19/ —21/ xd
Sept. 3	—	4½	Do. 4½ p.c. Red. Cum. Pref.	19/ —21/
,,	4	4	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6
,,	—	4	Do. 4 p.c. Irred. Cum. Pref.	18/6—20/6
Aug. 20	—	7	Barnet Ord. 7 p.c. max.	150—160
Aug. 6	—	5	Bath Cons. Ord .5 p.c. basic	97—102
Sept. 17	6½	10	Bombay, Ltd., Stock	46/- -49/-
Sept. 3	—	8½	Bournemouth Std. 5 p.c. sliding scale	165—175
,,	7	7	Do. 7 p.c. max. div.	150—160
,,	4	4	Do. 4 p.c. Pref.	97—102
,,	6	6	Do. 6 p.c. Pref.	124—129
Sept. 3	3½	3½	Do. 3½ p.c. Red. Deb.	94— 99
June 4	4	4	Do. Perp. 4 p.c. Deb.	97—102
Aug. 20	—	5·35	Brighton, &c., 5 p.c. Std. Cons.	95—100
,,		6·3	Do. 6 p.c. Std. Cons.	107—112
June 4	5	5	Do. 5 p.c. Perp. Deb.	110—115
Aug. 6	—	5	Bristol, Gen. Cap. 5 p.c. max.	97—102
June 4	—	4	Do. 4 p.c. New Deb. Red.	95—100
Oct. 1	—	7½	Brit. Gas Light Ord.	117—122
June 18	—	5½	Do. 5½ p.c. 'B' Cum. Pref.	107—112
June 4	4	4	Do. 4 p.c. Red. Deb.	95—100
Aug. 6	—	10	Cambridge U. & T. Orig. 10 p.c. Cons.	180—190
,,	—	5	Do. 5 p.c. Cons. 'C'	95—100
,,	—	7	Do. 7 p.c. Cons. 'B.'	125—130
Oct. 15	4½	4½	Cape Town, Ltd., 4½ p.c. Cu. Pf.	15/6—17/6
July 16	—	6½	Cardiff Con. Ord.	113—118
Aug. 6	—	5	Cheltenham, 5 p.c. basic Cons. Ord.	97—102
June 18	4	4	Do. 4 p.c. Perp. Deb.	95—100
Aug. 6	—	5½	Chester United Ord.	105—110
Oct. 29	—	7	Colombo Ltd., Ord.	35/ —40/ xd
,,	—	7	Do. 7 p.c. Pref.	23/6—25/6xd
Oct. 15	5	5	Colonial Gas Assn. Ltd. Ord.	16/—18/-
,,	—	8	Do. 8 p.c. Pref.	24/—26/-
Aug. 6	—	5	Commercial Ord.	79— 84
June 4	—	3	Do. 3 p.c. Deb. Perp.	75— 80
Aug. 20	5	5	Do. 5 p.c. Irred. Deb.	108—113
,,	—	6	Croydon sliding scale	113—118
,,	—	5	D max. div.	95—100
,,	4	4	Do. 4 p.c. Irred. Pref.	92— 97
June 18	4	4	Do. 4 p.c. Perp. Deb.	97—102
,,	5	5	Do. 5 p.c. Perp. Deb.	110—115
Aug. 20	—	8½	Derby Cons. Ord.	138—143
June 18	4	4	Do. 4 p.c. Red. Deb.	90—105
Aug. 6	—	5	East Hull Ord.	92— 97
Aug. 20	—	5	East Surrey 'B,' 5 p.c.	97—102
,,	—	6	Do. 6 p.c. Cum. Pref.	112—117
June 18	5	5	Do. 5 p.c. Irred. Deb.	110—115
Feb. 26	6½	6½	East Wight Cons. Ord.	110—120
Aug. 6	—	5	Eastbourne 'A'	90—100
,,	—	3½	Do. 'B'	85— 95
Aug. 20	5	5	Gas Consolidation Ord. 'A'	19/6 —21/6
,,	5	5	Do. Ord. 'B'	19/- —21/-
May 14	—	4	Do. 4 p.c. Red. Cum. Pref.	19/—21/-
Aug. 6	—	5	Gas Light & Coke Ord.	19/6—20/6
,,	—	3½	Do. 3½ p.c. max.	77— 82
,,	—	4	Do. 4 p.c. Con. Pref.	97—102
July 2	3½	3½	Do. 3½ p.c. Red. Pref.	95—100
June 4	3	3	Do. 3 p.c. Con. Deb.	83— 88
,,	5	5	Do. 5 p.c. Deb.	101—106
,,	4½	4½	Do. 4½ p.c. Red. Deb.	102—107
Sept. 3	3½	3½	Do. 3½ p.c. Red. Deb.	92— 97
Aug. 6	—	5	Gloucester Cons. Ord.	97—102
Feb. 12	2	Nil	Great Yarmouth (8½ p.c. max)	10 — 12½
Sept. 3	—	7½	Guildford Cons. Ord.	128—138
Aug. 20	—	5	Hampton C't, 5 p.c. Cons. Ord.	95—100
Sept. 3	—	5	Hartlepool G. & W. 5 p.c. Ord.	97—102
Oct. 1	—	6	Hastings & St. L. (5 p.c. Std.)	103—108
,,	—	5	Do. (3½ p.c. Std.)	82— 87
June 18	7½	6	Holyhead & N. Wales Ord.	22/—24/-
Aug. 6	—	5	Hornsey 3½ p.c. Std.	93— 98
,,	—	6·70	Do. 5 p.c. Std.	115—120
May 14	8½	8	Imperial Continental Cap.	107—112
July 16	—	3½	Do. 3½ p.c. Red. Deb.	95—100
Aug. 20	—	7½	Lea Bridge Co., Cons. Ord.	125—135
Aug. 6	—	5½	Liverpool 5 p.c. Ord.	105—110
Sept. 17	—	7½	Luton Cons. Ord. 'A'	120—130
,,	—	6½	Do. Ord. 'B'	105—115
July 16	7	7	Malta & Med'n., 7 p.c. 1st Pref.	100—110
,,	7½	7½	Do. 7½ p.c. 2nd. Pref.	105—115
Aug. 20	—	5⅝	M.S. Utility 'A' Cons.	97—102
	—	3⅜	Do. 'B' Cons.	68— 73
	—	5	Do. 'C' Cons.	95—100
	4	4	Do. 4 p.c. Cons. Pref.	93— 98
Oct. 30	4	4	Montevideo, Ltd. Ord.	112—122xd
Aug. 6	—	5½	Newcastle and Gateshead Ord.	22/—24/-
July 2	3½	3½	Do. 3½ p.c. Perp. Deb.	90— 95
Aug. 6	—	7	Newport (Mon.) Cons.	100—105
June 18	5	5	Do. 5 p.c. Perp. Deb.	105—110
Aug. 6	—	6⅞	North Middlesex 6 p.c.	115—120
,,	5	5	Do. 5 p.c. Pref.	103—108
,,	5	5	Northampton Cons.	99 —104
,,	—	10	Oxford, Cons. Ord.	160—180
June 18	5⅛	5⅛	Plymouth & Stone Ord.	103—108
,,	8½	8½	Do. Addl.	12/6—14/6
,,	7¼	7¼	Do. New	12/—14/-
Sept. 17	5	5	Do. 5 p.c. Deb. Perp.	110—115
Aug. 20	—	7½	Portsmouth & Gosport Cons.	133—138
,,	—	5	Do. 5 p.c. max.	95—100
Aug. 6	—	10	Preston 'A'	170—190
,,	—	7	Do. 'B'	130—135
June 24	46	4	Primitiva Holdings, Ltd. Ord.	10/—12/-
June 4	...	6	Do. 6½ p.c. Red. Cum. Pref.	97—102
Aug. 20	—	5	Reading, 5 p.c. max.	97—102
,,	—	—	Do. 4 p.c. Perp. Deb.	95—100
,,	4	4	Do. 3½ p.c. Red. (Non-Cum.) Pref.	95—100
Aug. 6	—	5	Romford, Ord.	97—102
Sept. 30	4	4	Do. 4 p.c. Debs. Red.	95—100
Sept. 17	—	7½	Severn Val. Ltd. Ord.	21/—23/-
,,	4½	4½	Do. 4½ p.c. Cum. Pref.	19/6—21/6
Aug. 20	—	6½	Sheffield Cons.	127—132
July 16	4	4	Do. 4 p.c. Red. Deb.	98—103
Sept. 3	—	6	South East'n Gas Ltd. Ord.	20/—22/-
,,	—	4½	Do. 4½ p.c. Red. Cum. Pref.	19-/—21/-
,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	18/—20/-
Aug. 6	—	5	South Metropolitan Ord.	88 — 91
,,	6	6	Do. 6 p.c. Irred. Pref.	113 —118
,,	4	4	Do. 4 p.c. Irred. Pref.	93 — 98
,,	3	3	Do. 3 p.c. Perp. Deb.	81 — 86
July 16	5	5	Do. 5 p.c. Red. Deb.	97 —102
Aug. 6	—	5	South Suburban Ord. 5 p.c.	97 —102
,,	5	5	Do. 5 p.c. Perp. Pref.	103 —108
,,	4	4	Do. 4 p.c. Perp. Pref.	95 —100
,,	3½	3½	Do. 3½ p.c. Red. Pref.	95 —100
June 4	5	5	Do. 5 p.c. Perp. Deb.	110 —115
,,	—	5½	South West. G. & W. Ltd. Ord.	19/--21/-
Aug. 6	—	5	Southampton Ord.	100 —105
Aug. 20	—	6	Sunderland Ord.	118 —123
,,	—	4½	Swansea Ord.	82 — 87
Aug. 20	5	5½	Do. 5½ p.c. Red. Pref.	98 —103
,,	—	7	Swindon Cons. Ord.	113 —118
,,	—	—	Tottenham Ord.	97 —102
,,	—	—	Do. 5 p.c. Pref.	103 —108
,,	—	—	Do. 5½ p.c. Irred. Pref.	105 —115
,,	—	—	Do. 4 p.c. Perp. Deb.	95 —100
June 4	4	4	Tunbridge Wells, 4 p.c. Sliding	115 —120
,,	—	—	U. Kingdom Ltd. Ord.	21/6—23/6
,,	—	—	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-
,,	—	4	Do. 4 p.c. 1st Red. Cum. Pref.	19/—21/-
,,	—	—	Do. 4½ p.c. 2nd Non. Cum. Pf.	19/—21/-
,,	—	—	Do. 3½ p.c. Red. Deb.	95 —100
,,	—	—	Uxbridge, &c., 5 p.c. Cap.	120 —125
,,	—	—	Do. 5 p.c. Pref.	103 —108
,,	—	—	Do. 5 p.c. Perp. Deb.	105 —115
,,	—	—	Wandsworth Cons.	98 —102
,,	—	—	Do. 4 p.c. Pref.	93 — 98
,,	—	—	Do. 5 p.c. Irred. Deb.	110 —115
,,	—	—	Do. 4 p.c. Irred. Deb.	95 —100
,,	—	—	Watford & St. Albans Ord.	97 —102
,,	—	—	Do. 5 p.c. Pref.	103 —108
,,	—	—	Do. 5½ p.c. Pref.	105 —115
,,	—	—	Weymouth Ord. (5 p.c. Basic)	95 —100
,,	—	—	Woking District "A" Ord.	180 —190
,,	—	—	Do. "B" Ord.	130 —135
,,	—	—	Wolverhampton Cons. Ord.	120 —126
,,	—	—	York Cons. Ord.	87 — 92